PHD

Defined-Benefit pension schemes in the United Kingdom: Study of the deficit funding approaches

Volkova, Anzela

Award date:
2020

Awarding institution:
University of Bath

Defined-Benefit pension schemes in the United Kingdom: Study of the deficit funding approaches

Anzela Volkova

A thesis submitted for the degree of Doctor of Philosophy

University of Bath

School of Management

September 2019

TABLE OF CONTENTS

ACKNOWLEDGMENTS

First and foremost, I would like to express my deepest gratitude to my supervisor Professor Ania Zalewska. Without her support, guidance, encouragement and patience, this thesis would simply not have been possible. I am very much thankful for the opportunity to work with Professor Ania Zalewska. I also wish to thank Dr Paul Baker for his insightful suggestions, comments and support I received during the last year of my study. I also would like to express my sincere gratitude to Dr Simone Giansante for his support and guidance at certain phases of my study. Lastly, I would like to thank my husband, daughter and mother for being very supportive and sensitive to my needs, especially during my study.

ABSTRACT

The UK is the second country in the world that has the most significant number of Defined-Benefit (DB) schemes whose aggregate funding positions have been in a decline since the 2000s. To reduce the deficit in the schemes, companies are required to make deficit repair contributions (DRCs). This thesis focuses on DRCs as one of the deficit funding approaches and the role of Chief Executive Officers (CEOs) and Chief Financial Officers (CFOs) inside debt (DB pension) holdings in the deficit funding of DB pension schemes in the UK.

DB pensions are generally unsecured and unfunded liabilities of the company. This means that managers with DB pension holdings are exposed to risk similar to that faced by outside debtholders of the company. As such, agency theory (Edmans and Liu, 2012; Jensen and Meckling, 1976) suggests that DB pension holdings negatively impact manager risk-appetite. To the extent that the manager risks losing accrued DB pensions when there is a deficit in the pension scheme (inside debt becomes unsecured when there is a deficit and the manager would stand in line with other debtholders if the company bankrupts), it is expected that DB pension holdings will incentivise managers to reduce the pension risk in order to increase the security of their pension provisions. Building on this argument, this thesis examines whether CEO and CFO inside debt holdings are associated with a higher probability of making DRCs. Investigating the determinants of the DRCs alone may raise a question of whether these DRCs were effective at reducing the deficit in the pension schemes. The anecdotal evidence suggests that making DRCs does not always lead to higher funding levels[1]. Therefore, given the

[1] For example, the research conducted by Mercer shows that companies in the FTSE350 paid about £20 billion in both normal and deficit reduction contributions during March 2011-March 2012, but the deficit for the same period increased by £17 billion (The Economist, 2012). Another example is Carillion, one of the largest construction companies in the UK, which failed in 2018. The company was making on average £40 million in DRCs each year over the 2010-2015 period. Despite these additional contributions, the deficit had grown from 250 million to £406 million for the same period. If DRCs payments were effective, the deficit of Carillion' DB schemes should have reduced by about £200 million – from £250 million in 2010 to £50 million by 2015, but the deficit not only decreased but increased further.

objective of DRCs (DRCs are expected to reduce the deficit in the scheme), this thesis also examines whether CEO and CFO inside debt holdings are associated with the higher funding levels of DB pension schemes.

Examining the funding levels of DB pension schemes, this thesis empirically documents a positive association between CEO DB pension holdings and the funding levels of DB pension schemes. Examining the funding policy of deficit (DRCs), the thesis also documents that CEO DB pension holdings are associated with the higher probability of making DRCs. Additional analyses suggest that the effects of DB pension holdings are more pronounced when the CEO is closer to retirement. However, examining the role of CFO inside debt holdings, the analyses fail to find any statistically significant relationship between CFO DB pension holdings and the funding levels of DB pension schemes and between CFO DB pension holdings and the probability of making DRCs. Overall, the obtained results highlight the importance of CEO DB pension holdings in investigating the financial health of DB pension schemes.

The thesis also addresses the question of whether companies with high debt in the capital structure affect the contribution policy of DB schemes. Capital markets theory (Cooper and Ross, 2002) suggests that capital markets imperfections may induce a company to make lower pension contributions to the scheme (making lower pension contributions is considered as borrowing from the scheme members). Existing studies examining the relationship between debt and the funding policy of DB schemes provide contrasting results without there being provided reasons why companies more likely to underfund or overfund their pension schemes. This thesis argues that the pension regulation must be considered when examining the relationship between the capital structure and the contribution policy of DB pension schemes because the regulation must be regarded as an important motivator or, instead, demotivator for companies to use pensions as a source of funding. Given that UK pension regulation is less restrictive, which may incentivise companies to use pensions as a source of funding, this study tests whether UK companies reduce pension contributions when they are financially restricted. Consistent with this prediction, empirical analyses document that companies reduce pension contributions when they are financially constrained.

This thesis makes several contributions. First, this thesis contributes to the literature on corporate DB pension schemes. In particular, it provides empirically established evidence on the determinants of the health of DB schemes by examining whether funding levels and the funding policy of deficit are related to CEO and CFO DB pension holdings. Second, this thesis also contributes to the literature on the usefulness of inside debt holdings at reducing the risk inducing effects. Third, this study contributes to the literature by documenting that the effects of DB pension holdings become more pronounced when the CEO approaches closer to retirement suggesting that the importance of pensions increases in the age of the CEO. Fourth, this thesis contributes to the literature by examining the relationship between debt in the corporate structure and pension contributions. It is worth noting that this thesis is the first that examines different types of pension contributions – regular pension contributions and DRCs. These contributions differ significantly in their stated objectives, and thus it is important to understand the impact of debt on both - regular pension contributions and DRCs. Overall, this thesis contributes to a better understanding of the factors that influence the funding positions and the funding policy of deficit of DB schemes.

UK-based literature on DB pension funds is limited, which can be partly attributed to the lack of a comprehensive (readily available) database on DB pension characteristics. To this end, a unique feature of the thesis is the use of a hand-collected dataset from the companies annual reports, which enables to understand the corporate DB pension schemes in the UK. The limited empirical evidence on corporate DB schemes in the UK makes this thesis's findings particularly valuable to the pension regulators, policymakers and the boards who can improve the management of DB schemes and prevent the schemes from being underfunded.

Chapter 1

Introduction

Pensions have become an important source of income for retirees. Pension funds also have become important economic institutions both in the UK and worldwide. Of the total pension liabilities at the end of 2015, employment-related (occupational) pension accounted for about £2.3 trillion while state pension accounted for about £5.3 trillion. Together, these pension liabilities represented about 400% of UK gross domestic product (GDP) (ONS report from 2018[2]). However, more than £5 trillion of these pension obligations were unfunded. This means that pension assets were worth only about £2 trillion that represented just a quarter of the required pension assets needed to finance all these obligations. Although the size of the pension assets highlights the vital role of pensions in capital markets, the fact that pension liabilities far exceed their assets indicates that the pension industry is in financial trouble.

The employment-related (occupational) defined-benefit[3] (DB hereafter) pension schemes have already attracted enough attention of public, policymakers and academics as the funding has been in decline over the last decade or so. For example, at the end of 2015 the aggregate deficit of the private DB pension schemes estimated at £222.9 billion, which increased from a

[2] Pensions in the national accounts, fuller picture of the UK's funded and unfunded pension obligations: 2010-2015.

[3] There are two major types of occupational pension schemes: defined benefit (DB) and defined contribution (DC). Pensions under DB schemes are determined by the formula rather than by the performance of the pension as under DC schemes that take into account the years of service, salary in final years and accrual rate of benefits. This means that members of DB schemes are expected to receive a pre-determined pension even if pension fund underperforms since companies sponsoring these schemes are legally obliged to cover the deficit (underperformance). However, members of DC schemes are expected to bear all the losses since pension benefits will be determined by the value of the pension assets at the date of retirement.

surplus of £97.2 billion at the end of 2003 (The PPF 7800 Index – estimated funding positions 2003-2015). Moreover, the public has become particularly concerned about the sustainability of DB schemes because the deficit significantly increased during 2008/09 and remains high even today despite that it is now ten years since the crisis. For example, since August 2011, pension liabilities have almost always exceeded the value of pension assets with the highest deficit in August 2016 - the point where aggregate underfunding of private DB pension schemes reached nearly a half of trillion of pounds.

Moreover, concerns over the sustainability of pension schemes have further intensified by the occurrence of the bankruptcy of large public companies with a large proportion of underfunded pension liabilities. For example, British Home Store (BHS) failed in 2016, leaving a pension scheme in deficit by more than £500 million. One of the largest UK construction company sponsoring over 28,000 members across 13 pension schemes, Carillion, failed at the beginning of 2018. Despite that both BHS and Carillion paid additional pension contributions to reduce the underfunding in the schemes, the deficit was persistent. For example, for Carillion, the deficit grew from around £25 million in 2007 to £240 million in 2010 to £498 in 2014 and £587 in 2017. According to the Pension Protection Fund (the PPF) estimates, at the time of the collapse, the actual deficit estimated to sit at around £900 million (Briefing paper (2018), House of Commons). This raised fear among pension scheme members because they risk losing pensions when the company bankrupts, and there is a deficit in the DB scheme. Moreover, there are growing public concerns that more companies with unfunded pension schemes could fail in the future. However, the challenges that private pension schemes face today is a global issue rather than the UK-specific problem. According to an OECD report from 2018[4], in 2017 the UK and the US alone had a £5 trillion shortfall in private DB pension schemes only. The reality is far challenging when both corporate and state pensions are

[4] Pension Markets in Focus 2018

considered. For example, the shortfall of the 20 largest OECD countries reached a $78 trillion that is nearly 2 times higher the value of these countries' collective debt, and the pension deficits have been described as a "*global crisis in waiting*" (Zalewska, 2018[5]). These challenges highlight the need to study pension schemes.

This thesis focuses on corporate DB pension schemes, and the primary objective of this thesis is to study the deficit funding policy, DRCs. There are several aims in this thesis. The first aim is to investigate the relationship between CEO inside debt incentives and the funding positions of DB pension schemes. It is predicted that companies whose CEOs have inside-debt incentives generated by DB pensions are associated with higher funding levels in DB schemes. The justification for this prediction lies within agency theory. Agency theory (Edmans and Liu, 2011) suggests that DB pension holdings counter the risk-shifting incentives that arise as a result of compensating the manager with equity. This is because DB pensions are generally unsecured and unfunded liabilities of the company and executives with DB pension holdings are exposed to risk similar to that faced by outside debtholders of the company. To the extent that the executive risks losing accrued DB pensions when there is a deficit in the pension scheme (inside debt becomes unsecured when there is a deficit and the manager would stand in line with other debtholders if the company bankrupts), it is expected that DB pension holdings will incentivise executives to reduce the pension risk in order to increase the security of their pension provisions.

The second aim of this thesis is to investigate the relationship between CFO inside debt holdings and the funding levels of DB pension schemes. The extant literature focuses almost exclusively on the role of CEOs and how they affect the funding policies of DB pension schemes. However, there are strong reasons why CFOs inside-debt incentives might be of importance too. First, corporate decisions are often made in teams, which can change the

[5] Huge pension fund deficits are a global crisis in waiting, the Conversation (2018)

decision-making dynamics (Hsieh, Wang, and Demirkan, 2018; Aggarwal and Samwick, 2003). Second, similar to CEOs, the holdings of DB claims are also remarkable among CFOs that could also instigate CFOs to look after DB schemes to regard their personal financial interests. For example, 44% of CFOs in the sample hold DB pensions with an average value of pension of £86.85 thousand or 4.24% of their total accumulated wealth. In comparison to CFO, there are 46% of CEOs in the sample who hold DB pensions with an average value of pension of £177.74 thousand that represent 3.64% of their total accumulated wealth. While these numbers indicate that in pound value CFOs DB pensions are about two times lower than CEOs DB pensions, DB pensions appear to be equally important for both CEOs and CFOs relative to the aggregate wealth suggesting that CFOs may also exert influence over the DB pension schemes. Third, CFOs are responsible for financial management, and CFOs incentives could particularly be influential in pension decision making. For example, Florackis and Sainani (2018) argue that the role of the CFO has evolved considerably and has expanded beyond the traditional controllership and compliance functions, but the role of CFO has received much less attention in the literature compared to CEO. Investigating how CFOs matter to corporate financial policies, Florackis and Sainani (2018) find that a CFO has an ability to influence financial decision-making. Therefore, the second empirical chapter of this thesis examines whether CFO inside-debt incentives are associated with the higher funding of DB schemes.

The third aim of this thesis is to investigate whether managerial inside debt incentives are related to the deficit funding approaches. The new scheme-specific funding requirement introduced by the Pension Act 2004 prescribes companies to deficit-repair contributions (DRCs) if there is a deficit. However, new funding requirements allows companies to adjust the frequency and size of DRCs payments to their circumstances as there is no time over which the deficit should be eliminated. Such flexibility leaves scope for managerial discretion. Building upon the agency theory that holdings of DB pensions create strong incentives to manage the pension risk, the third empirical chapter of the thesis predicts that inside debt holdings are associated with a higher probability of making DRCs. Combining the evidence from the above studies, it becomes possible to establish whether DRCs are effective at reducing the deficit. To understand whether companies which are associated with a higher probability of making DRCs are also associated with higher funding levels is important because DRCs do not always prove to be effective (lead to higher funding levels/lower deficit in the pension scheme). For example, the research conducted by Mercer shows that companies in the FTSE350 paid about £20 billion in both normal and deficit reduction contributions during March 2011-March 2012, but the deficit for the same period increased by £17 billion (The Economist, 2012). Another example is Carillion, one of the largest construction companies in the UK, which failed in 2018. The company was making on average £40 million in DRCs each year over the 2010-2015 period. Despite these additional contributions, the deficit had grown from 250 million to £406 million for the same period. The ineffectiveness of DRCs perhaps reflects some CFOs' perceptions about the pension deficit. Back in 2013, Carillion's former CFO considered putting cash into the company's pension deficit a "waste of money", according to the minutes of a meeting between Trustee representatives and the Pensions Regulator regarding failure to agree the 2011 valuations[6]. Carillion's former CFO had no DB pension in the company's pension scheme.

The fourth and last aim of this thesis is to study whether the companies with DB pension arrangements reduce the pension contributions when they have high debt in their capital structure. Studies examining the relationship between pension contributions and the corporate structure of the company have neglected to consider the role of pension regulation (Davies and de Haan, 2012; Bartram, 2018). However, this thesis argues that less restrictive regulation can

[6] The attendance note is available at https://www.parliament.uk/documents/commons-committees/work-andpensions/Carillion/Carrillion.pdf.

incentivise companies to underfund their DB schemes when they are financially constrained. In the UK, pension regulation does not set the deadline for eliminating the deficit. Such regulatory “freedom” may underlie the incentives to delay making DRCs. It also creates incentives to reduce regular contributions as the company can effectively spread the current deficit, which will occur as a result of under-contributing, into future periods. Therefore, the final chapter of this thesis investigates whether companies with DB schemes in the UK and which type of pension contributions they reduce pension contributions when they are financially restricted.

To accomplish all four aims, this thesis uses a hand-collected data for the sample of UK companies over the period 2004 to 2015 data - the data, which is not freely available for download. The UK provides a unique setting for empirical investigation. The first motivation behind examining a UK sample is the limited evidence on the role of executives inside debt holdings in the health of DB schemes in the UK. The extant literature focuses almost exclusively on US companies. For example, Cheng and Swenson (2018), Y Yu-Thompson (2015), Begley, Chamberlain, Yang, and Zhang, (2015) look at the role of CEO inside debt holdings in the financial health of DB pension schemes in the US. To examine the role of managerial incentives on pension funding in the UK is interesting because of the specific regulatory framework for companies with corporate DB pension schemes in the UK. In the UK, the pension benefits are protected by the Pension Protection Fund (PPF) up to a compensation limit. This means that the PPF will pay pension benefits (subject to the compensation cap) if the company bankrupts and there is a deficit in the pension scheme. Such protective measures are good for the pension scheme members but could create conflicting incentives even among CEOs with DB pensions of different sizes due to the differences in risks of the pension claims.

Second, there is no, due to no data available for download, research that examines the funding policy of deficit of DB schemes. However, there is an explicit need to understand the underlying motives of making these DRCs given the importance of those contributions on pension funding.

Third, researchers have primarily focused on the role of CEO inside debt incentives. However, existing research suggests that CFOs inside-debt incentives might be more influential than those of CEOs (Anantharaman and Lee, 2014; Florackis and Sainani, 2018). Therefore, more research is needed to understand who influence most the pension funding decisions.

Fourth, studies examining the relationship between pension contributions and the corporate structure of the company has neglected to consider the role of the pension regulation. This possibly explains why the existing research produce contrasting results without there being provided reasons why companies are more likely to be inclined to underfund or overfund their pension schemes (Davies and de Haan, 2012; Bartram, 2018). However, pension regulation must be regarded as an important motivator or, instead, demotivator for companies to use pensions as a source of funding. For example, the regulation of occupational pension schemes in the UK is specific regarding how companies tackle the deficit – companies may consider long periods to eliminate the deficit in the scheme. Such regulatory flexibility allows companies to take an excessive risk by maintaining the underfunding over the longer period without necessary intervention from the regulatory body. Therefore, focusing on DB pension schemes in the UK this thesis, along with to the contribution to the literature on the determinants of the contribution policies of DB schemes, sheds a light on the effects of the pension regulation which is currently in place.

Fifth, while existing studies on pension contributions focus on total pension contributions, pension contributions consist of regular pension contributions which companies should make to cover the regular cost and additional pension contributions which companies should make to reduce the deficit. However, companies are not expected to make lower pension contributions when they lack the cash or face borrowing restrictions except for DRCs, which can be set up that best suit their financial needs. As there is a fundamental distinction between two types of pension contributions, it is important to examine what factors influence each type and whether companies manage DRCs, regular contributions or both.

This thesis aims to contribute to the literature by addressing the gaps discussed above. Moreover, a unique feature of the thesis is the use of a dataset which was hand-collected from the companies' annual reports. The use of the hand-collected data makes a distinctive contribution to the research on corporate DB pension schemes. In particular, this thesis contributes to a better understanding of the factors that influence the funding of DB pension schemes. Knowing factors that contribute to the deficit can help to improve the management of DB schemes to prevent the scheme from being underfunded and protect the interests of the pension scheme members.

Moreover, research findings presented in the thesis have important policy implications because they provide useful insights regarding the effectiveness of the Pension Act of 2004. For example, this last study's findings reveal that companies tend to manage both regular pension contributions and DRCs. Managing regular pension contributions can harm the pension scheme members as it not only increases the likelihood of default but also lowers the amount of pension assets. In particular, making lower regular contributions would increase the deficit in DB schemes because the reduction in regular contributions is driven by the company's need for a higher cash and not by the lower cost of DB pensions. Second, DRCs may be less effective at reducing the deficit if the company also reduces regular contributions. This can explain why the deficit in DB schemes in some companies grows despite having paid DRCs (e.g., Carillion, BHS). Therefore, these findings reveal important implications for the management of DB schemes, which might also be of interests to pension regulators who may consider improving the existing pension regulation. For example, regulators may consider more transparent reporting practices to prevent pension assumptions management and introduce the deadline for eliminating the deficit. These measures may help to improve the regulation regarding how companies deal with the pension deficit and enchase the security of the members' benefits. Moreover, as a primitive measure, the pension regulators may pay more attention to companies whose schemes funding worsens, since this may indicate that some of the pension assumptions might be violated. The stronger attention should be paid to companies which make DRCs and whose schemes funding worsens and/or does not improve since there could be a substitution effect through pension assumptions manipulation. These steps may prevent the pension scheme to restore the funding levels.

This thesis is structured in seven chapters as follows. Chapter 2 provides a brief overview of the funding of occupational pension schemes in the UK. It briefly discusses the factors that contributed to the problem of underfunding in DB schemes. It also briefly discusses the pension regulation and how it prescribes companies to tackle the deficit. The final section of this chapter describes the data that will be used in this thesis. Chapter 3 reviews relevant theoretical and empirical literature. In particular, it reviews agency and capital markets imperfection theories and related empirical studies on corporate DB pensions. The chapter ends with a discussion of how this thesis contributes to the literature. Chapter 4 presents the empirical study that examines the relationship between CEO and CFO inside debt holdings and the funding levels of DB schemes. Study in Chapter 5 examines the relationship between CEO and CFO inside debt holdings and the funding policy of deficit of DB schemes. Chapter 6 presents the last empirical study that examines whether companies with high debt in the capital structure reduce pension contributions to DB schemes. The thesis ends up with a brief conclusion by summarising findings and discussing implications that emerged from these findings. The final section of this thesis discusses the limitations of the studies and future research direction.

Chapter 2
Background and Data

2.1. Background on DB pension schemes funding

At the turn of the century, the private pension sector started to observe a decrease in the numbers of employees covered by occupational pension schemes. The increased cost of DB pensions is argued to be the main factor that contributed to the decline of DB schemes (Ross and Wills, 2002; Aaronson and Coronado; 2005; Banks, Blundell, and Emmerson, 2005). Literature highlights several factors that made DB pensions more costly. One of these factors is life expectancy. Life expectancy increased globally. For example, in Europe, a sixty-five-year person can expect to live for another 15 years today, 20 years by 2050 and over 25 years by 2100 compared to the person in 1950 (United Nations World Population Prospects, 2017). While these positive tendencies are good for society, the increases in life expectancy shifted the costs of DB pensions upward because the life expectancy projections are used to calculate the pension liabilities. For example, it is estimated that each year of life expectancy raises pension liabilities by around 4-5 per cent (Kisser, Kiff, Oppers, and Soto, 2013). In dollar value, a one-year shock to longevity could lead to a very material change in the value of pension liabilities. For the US, it is estimated that a one-year increase in life expectancy could increase the corporate pension liabilities by as much as $110 billion[7] (Kisser, Kiff, Oppers, and Soto, 2013). At a global level, they show that a one-year shock to longevity would raise the pension liabilities by $1.1 trillion, from $23.3 trillion to $24.4 trillion.

[7] Calculation are made using data for 2007. As of 2007, the aggregate value of corporate pension liabilities estimated at $2.2 trillion with a deficit of $81 billion.

Another factor is the market discount rate which is used to determine the current value of the future pension liabilities. Studies examining the effect of changes in the discount rates on pension liabilities show that a 1% decrease in the discount rate would increase the value of the pension liability by 15% – 18% (May, Querner, and Schmitz, 2005; Gohdes and Baach, 2004; Glum, 2008 as in Billings, O'Brien, and Woods, 2009; Accounting Standard Board, 2007). As the interest rates dropped during the financial crisis and remain relatively low since then, companies incur a higher cost of DB pensions. In particular, companies need to make higher contributions to meet future pension liabilities as well as remove the deficit, which resulted from a drop in the market interest rates. For example, for FTSE350 companies, it has been estimated that the drop in short-term rates by 100-150 basis points and 40-60 basis points in the long-term interest rates between August and December 2008 triggered an increase in the value of pension liabilities from US$300 billion to US$400 billion (Impavido and Tower, 2009).

Weak investment performance and losses during the financial crisis is another factor that increased the costs of DB pensions. It is estimated that if a pension fund achieves a return of 6% per annum, around two-thirds of the pension benefits will be covered by investment returns, and only one third have to be met by direct contributions from the sponsoring company (Franzoni, 2007). Given that pension schemes performed well throughout the 1980s and 1990s, many companies required to make low or even no pension contributions due to higher investment returns. However, since about 2000s the cost of DB pensions significantly increased due to the weak investment performance. It is calculated that the average rate of return on pension assets in the UK estimated at 9.5% during the 1982-2005 period and only 1.9% for the 2000-2005 period (Tapia, 2008; Antolin, 2008). Moreover, the financial crisis of 2008/09 sharply undermined asset values. For example, UK private pensions alone have lost about US$300 billions of dollars in assets during the financial crisis – the second most significant losses in asset values by private pension funds after the US that lost about US$2.2 trillion of dollars (OECD report from 2008)[8].

Increase in life expectancy, low interest rates and weak performance of equity markets all contributed to the higher cost of DB pensions, suggesting that companies are exposed to significant cash outflows. The latest figures reveal that as of September 2016, the annual cost of DB pensions accrued over the year was estimated at 36.6% of employee earnings (Sweeting, 2016). This is multiple times higher than the cost of alternative pension arrangement such as DC that estimated to be only 4.0% of employee earnings (Sweeting, 2016). Moreover, companies are also obliged to remove the deficit by making additional pension contributions which makes DB pensions even more costly. Graph 2.1 shows that deficit in DB schemes sponsored by the UK companies has significantly increased after the financial crisis and remain high. For example, at the end of December 2015, around 80% of the corporate pensions schemes in the UK were underfunded (PPF, December 2015 Update). The aggregate position of all pension schemes was a deficit of £222.4 billion at the end of December 2015, which decreased further to £223.9 billion at the end of December 2016. For comparison, by the end of December 2003, there were around 32% of pension schemes in deficit with an aggregate surplus of 97.2 million. Graph 2.1 shows that the funding positions of DB schemes deteriorated, and this highlights the need to study corporate DB pension schemes to understand the factors that influence the funding of pension schemes for better scheme management and deficit prevention.

It is worth mentioning that the increase in the deficit is also likely to reflect both global and domestic factors. The funding positions of DB pension schemes have fallen since 2008 as a result of the global financial crisis. But there are also domestic factors that have been important

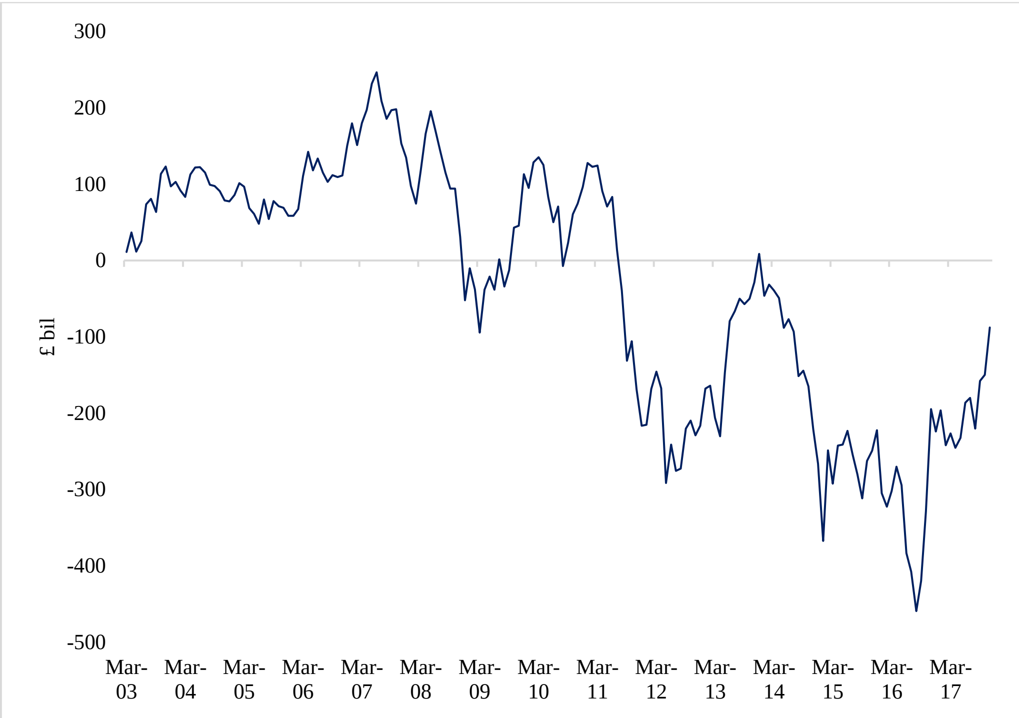
[8] Pension Markets in Focus, December 2008, Issue 5.

too and which likely have contributed to the deficit problem. One of those domestic factors is likely to have been the Bank of England's asset purchase programme (or QE) aimed to boost the macroeconomy by lowering long-term interest rates and stimulating spending. Related studies estimate that the first £200 billion of QE depressed gilt yields by around 100 basis points (Joyce et al., 2011, 2012; Joyce and Tong, 2012). Inman (2015) estimates that in 2012 the total purchases of government bonds rose to £375 billion from £75 billion in 2009. As a result, lower long-term interest rates increased the size of pension deficits for DB schemes that were already in deficit. The sharp increase in deficit observed in the 2011-2012 period (Graph 2.1) more likely reflected the effects on QE programme which also reflects the decline in UK bond yields (Graph 2.2). The increase in deficit observed in the 2014-2015 period can also be related to the QE programme launched by the European Central Bank in 2015. The impact of these programmes was a sharp drop in global bond yields including the UK. Another sharp increase in the deficit is observed in the 2016-2017 period. This widened funding gap more likely to reflect the EU referendum results after which bond yields dropped to their lowest values due to worsening in the economic outlook and expectations of trade barriers between the UK and the EU (Graph 2.2.).

This sub-chapter briefly discussed the major factors that contributed to the cost of DB schemes. Higher costs of DB pensions forced companies to switch to DC schemes which are less expensive to companies. By switching from DB to DC scheme, the company also transfers the investment and longevity risks to the employees (Broadbent, Palumbo, and Woodman, 2006). However, although DB pensions become less popular, they still remain a prominent feature of the UK pension landscape. For example, more than a million UK workers in the private sector alone are still actively accumulating pensions under DB schemes, and around 11.2 millions of people have preserved DB pension entitlements, as shown in Graph 2.2 (ONS report from 2017[9]). This means that companies will be responsible for the funding of DB pensions until the end of this century.

Graph 2.1

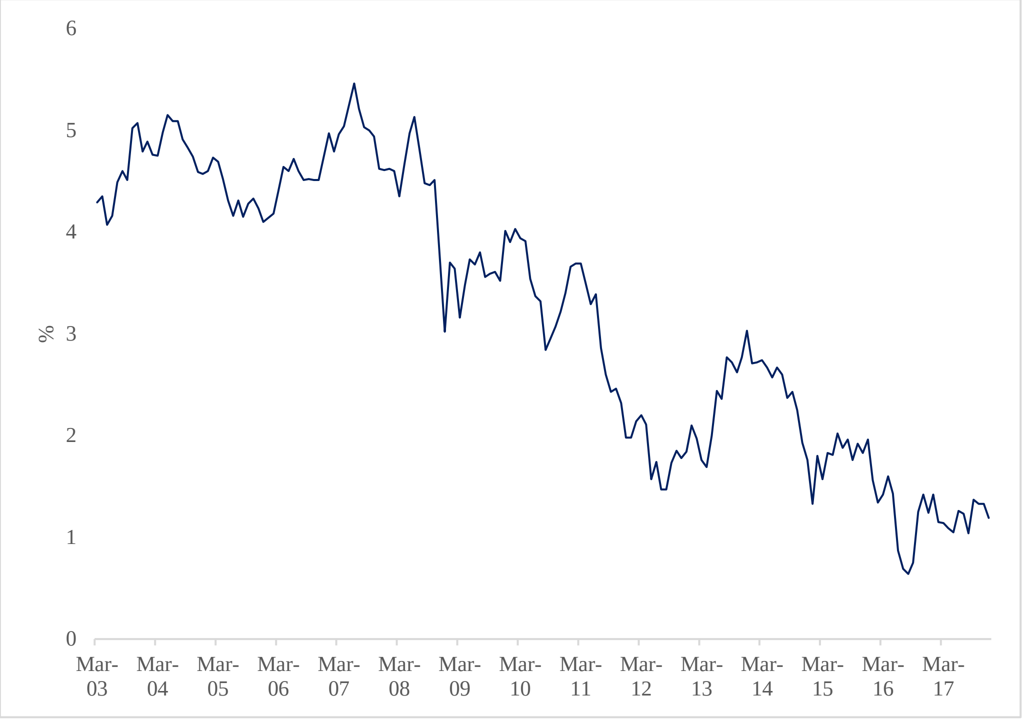
Estimated aggregate balance (pension assets minus pension liabilities) of schemes in the PPF 7800 Index over the March 2003-December 2017. Notes: Graph prepared by the author based on the data presented in the annual updates that are published by the PPF. Source: The graph was prepared by the author based on the data collected from Pension Protection Fund, Monthly Updates.



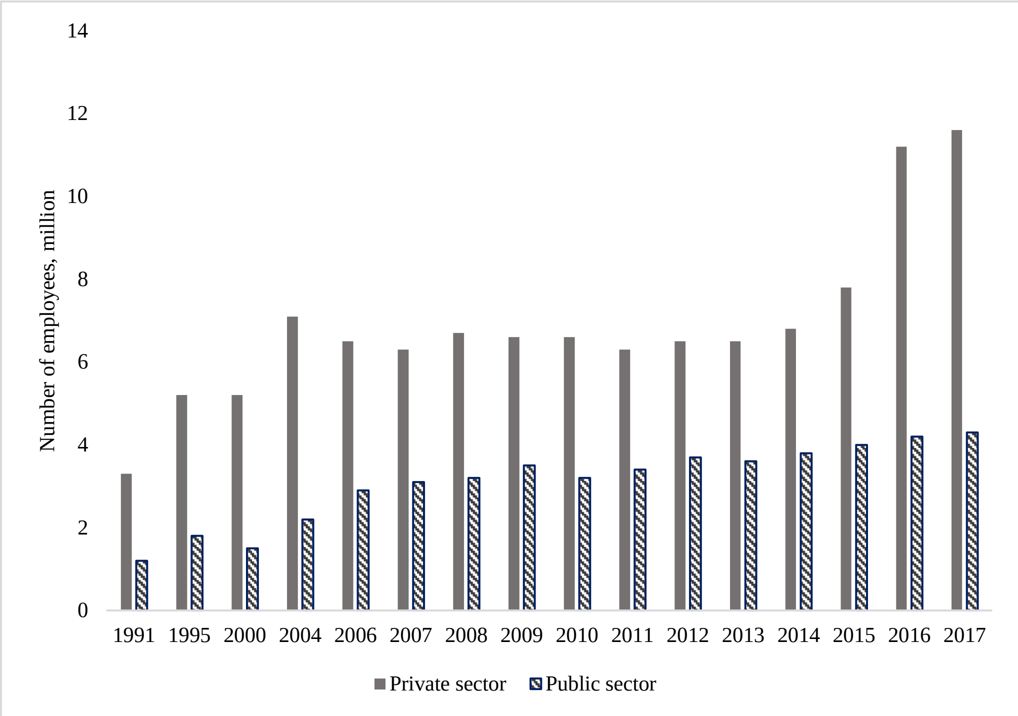
[9] Occupational Pensions Schemes Survey, UK: 2017. Occupational pension provision in the UK, providing summary data for membership of schemes and contributions paid.

Graph 2.2

United Kingdom Government Bond Yields (10 Year) over the March 2003-December 2017. Source: The graph was prepared by the author based on the data collected from Trading Economics.



Graph 2.3
Number of preserved pension entitlements in occupational pension schemes by sector, 1991 to 2017 (millions). The graph was prepared by the author based on the data collected from Occupational Pensions Schemes Surveys published by the Office for National Statistics.



2.2. Pension regulation and accounting standards

In 1995 under the Pension Act 1995, the UK government introduced the Minimum Funding Requirement (MFR). The MFR was introduced to protect pensioners and other scheme members' rights by setting a benchmark for the acceptable level of risk for the scheme's assets. It required DB corporate pension schemes whose assets fall below the minimum set by the MFR test to make up the shortfall within the prescribed time to protect pensioners and other scheme members' rights. For example, if the MFR test revealed a deficit in the scheme, the company was allowed one year to reach 90% of the MFR level and five years to reach 100%. However, MFR was widely criticised for adversely influencing the investment decisions and not providing a sufficient level of guarantee to pension scheme members because MFR funding requirements never proved sufficient to provide promised level of pensions the case of bankruptcy (Myners report, 2001). As a result, the Pension Act 1995 was replaced by the Pension Act 2004.

The Pension Act 2004 differed in many ways from the Pension Act 1995. For example, the Pension Act 2004 first established a new regulatory body, the Pension Regulator (PR), with a power to intervene, if necessary, in the administration of occupational pension scheme. Second, it also created a new compensation scheme, the Pension Protection Fund (PPF), to provide a guaranteed level of pension benefits to members of underfunded corporate pension schemes whose employers are unable to pay the contractual pension promises they made. Third, with an introduction of the Pensions Act 2004, the MFR funding requirements were replaced by the new “scheme-specific” funding requirements. In contrast to MFR, the new “scheme-specific” funding requirements do not set the time prescriptions over which the deficit should be eliminated. This means that companies have been able to consider a more flexible approach with longer funding periods over which the full funding can be achieved.

In aggregate, these improvements are planned and introduced to provide better protection to scheme members. However, this thesis draws attention that existing regulation may also contribute to the pension deficits problem. Moreover, current regulation makes the regulators valuable to prosecute companies from inappropriate behaviour towards their pension schemes. In particular, the Pension Act 2004 provides more time for companies to eliminate the deficit as the PR takes into account the financial affordability of sponsoring employer to make additional contributions allowing them to adjust DRCs to their financial circumstance. Since there are no strict requirements that dictate how and when the deficit should be eliminated, trustees and employers have been able to consider a more flexible deficit funding approaches. From one hand, such flexibility allows companies to cope with tough economic conditions and minimise the risk of being financially pressured by removing underfunding, sometimes high, in a very short time. From another hand, such flexibility allows companies to take excessive risk by maintaining the underfunding over the longer period without necessary intervention from the regulatory body. Most importantly, such flexibility does not prevent companies from making lower regular pension contributions – contributions that companies make to cover the regular cost of DB pensions. By making lower regular pension contributions, the company can spread the current deficit as a result of under-contributing into future periods through DRCs payments. Therefore, lighter regulation may induce companies to take more risk.

Although companies are not expected to pay lower contributions except for DRCs, which can be set up that best suit their financial needs, companies may manage discount rates, investment policy and other pension assumptions. For example, by setting a higher discount rate or expected returns on pension assets company reduce the cost of pensions that also reduces the size of pension contributions needed from the company. Although companies follow International Accounting Standards (IAS) to disclose assumptions used to measure DB pension liabilities, studies examining the pension assumptions show that accounting standards do not prevent companies from manipulating. For example, the Pension Adviser Review finds, that in the fourth quarter of 2004, the assumed discount rate across all companies varied between 4.85% and 5.09% (Williams, 2005). For FTSE 100 companies during the financial crisis when bond yields were volatile, Lane Clark and Peacock (2009, p. 36) find that discount rates ranged from 5.6%-6.75%. Another study shows that at the end of 2011, the range of discount rates used by FTSE 100 companies ranged from 4.7 - 4.9% (Lane Clark and Peacock report, 2012). Given that pension liabilities are long-term obligations, even a relatively small variation in the discount rate can lead to substantive changes in the present value of the pension liabilities. As previously discussed, a 1% increase in discount rate might reduce pension liabilities by 15% - 25% (May, Querner, and Schmitz, 2005; Gohdes and Baach, 2004; Glum, 2008 as in Billings, O'Brien, and Woods, 2009; Accounting Standard Board, 2007, Bozewicz, 2004).

There are other assumptions that the company needs to make. For example, the company needs to determine the expected rates of return (ERRs) on pension assets. ERRs may be wide-ranging across different pension schemes because each scheme has different asset allocation and, thus, granting substantial discretion over the ERRs. For example, to reduce the company's costs, the company may take more risk by investing a higher share of pension assets into equities. Companies also should determine the future price inflation, salary rise and life expectancy assumptions. These assumptions also may differ between companies because companies operate in different sectors and different geographical regions that make it difficult to evaluate the validity of these assumptions. Although for accounting periods beginning on or after 1 January 2013 companies require to disclosure 'significant actuarial assumptions' to prevent the pension assumptions manipulation (IASB, 2011), Billings, O'Brien, Woods, and Vencappa, (2017) argue that companies still have discretion in selection of the pension assumptions.

Overall, the choice of pension assumptions has a material impact not only on the reported liabilities but also on the size of pension contributions that company should set aside to cover the regular cost of pensions and past service deficit. While current pension regulation allows companies to take more time to reduce the deficit, companies, due to lighter regulation, may also use their discretion over the pension assumptions to reduce regular pension contributions. However, the economic consequences of lighter regulation might be significant because the companies with DB pensions may also suffer from the danger that one failing institution sometimes referred to as "too-big-to-fail" could cause other related organisations to also fail, harming the economy as a whole (Zalewska, 2018). For example, in 2007, the peak market capitalisation of the Royal Bank of Scotland and Lloyds Banking Group were £64 billion and £33 billion respectively - was small compared to the size of the pension fund deficits, but the British government had to inject £850 billion to rescue the UK bank sector from collapsing.

These examples show that "too-big-to-fail" companies may take excessive risk-taking regarding their DB pension schemes but they won't have to pick up the pieces if things fall apart because these companies are more likely to be saved by the government as their failure represents unacceptable systemic risk. In the background paper on the importance of the financial institutions, the International Monetary Fund (IMF) also warned that pension funds can pose systemic risk to the financial system[10]. For example, the pension funds which are underfunded might move towards riskier investments in order to try to chase increased returns and reduce deficits. Moreover, a move toward riskier asset classes may also be provoked by negative real rates on bonds. For example, the chairman of the London Pension Fund Authority (LPFA), Edmund Truell, said: "*We are in a position where we do not have enough assets to meet our liabilities. If our rate of return on gilts is 3% before inflation, probably nothing after inflation, we are not going to be able to pay the pensions. Therefore, we are safely guaranteeing bankruptcy by investing in gilts. I don't consider gilts to be an appropriate investment for an underfunded pension fund*"[11]. However, this could seriously compromise the long-term solvency of the pension schemes because risky investment strategy may not solve the deficit problems and even compound them. While the pension deficits themselves cannot cause systemic risk to financial markets because pension schemes are not interconnected with the financial markets in the same way as banks and they are considered as users of the markets, the concerns started to appear if the deficit poses the risk to the company. Some schemes may have large deficits and the sponsoring company may not have ability to make up the shortage. If the failure of the sponsoring company would pose a high systemic market risk, it is more likely that the government would be required to intervene.

[10] Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations— Background Paper, October 2009. Available at https://www.imf.org/external/np/g20/pdf/100109a.pdf

[11] London pension body sells entire stock of UK gilts. The article is available at https://www.ft.com/content/65192d3a-aac1-11e3-be01-00144feab7de

2.3. Data

The data used in this thesis covers British companies in the FTSE 350 index. The FTSE 350 index has been chosen for several reasons. First, it incorporates the largest (measured by the market capitalisation) British companies that are listed on the London Stock Exchange (LSE). Companies that publicly trade on the stock market are required to disclose the information on the corporate pension schemes they sponsor. However, the disclosure of the information on the employer-sponsored DB pension schemes has only been mandatory since 1st January 2005 when the new IASB accounting standard was introduced (Yermo, 2008). Second, according to the FTSE group website companies in the FTSE 350 combines largest first 100 companies and the next 250 companies that represent around 95 per cent of the overall UK equity market by the value that captures a large share of the UK businesses. Further, according to the data reported by Mercer's Pension Risk Survey, at the end of December 2015, the aggregate value of pension assets of companies in the FTSE 350 index in DB schemes was estimated to be around £634 billion and the combined value of projected pension liabilities to be around £673 billion. This represents approximately more than 50 per cent of the total assets accumulated in all DB pension schemes in the PPF 7800 index, which was estimated to be around £1,250 billion at the end of December 2015. The sheer size of these assets and obligations highlight the significance of DB pensions in the FTSE 350 companies.

The observation period starts in 2004 and ends in 2015. The sample includes 209 unique companies in the FTSE 350 index with DB pension arrangements. This includes 201 companies which were constituents of the FTSE 350 in 2015. As the number of companies in the stock index change regularly and not all companies were part of the FTSE 350 index in 2015 but possibly were constituents in previous years, the sample has been extended by including companies that were part of the FTSE 350 in previous calendar years, e.g., between 2004 – 2014, but were not included for number of reasons: (1) delisted due to bankruptcies or takeovers; (2) had been a member of stock market index other than the FTSE 350; (3) DB scheme had been wounded up or sponsoring employer had sold off their pension liabilities.

Time series of observations for each company are compiled annually. The data gives a sample of 2280 observations in total for 209 companies over the 2004-2015 period. This represents over 90 per cent of all possible observations for 209 companies in the FTSE 350 with DB arrangements over the 12-years[12]. Table 2.1 reports the summary of the frequency of annual observations available on companies and shows that data on pension-related data for all 12 years is available on about three-fourths of companies. Table 2.2 reports the distribution of yearly observations.

Table 2.1
The summary of frequency of annual observations of companies in the FTSE 350 index. The number of observations is the product of frequency of annual observations and the number of companies. Notes: The statistics shown in this table was calculated by the author based on the data collected from the companies' annual reports and DataStream.

	Frequency of observations	Number of companies	%	Number of observations	Cum. %
	12	157	75.12	1884	82.63
	11	9	4.31	99	4.34
	10	9	4.31	90	3.95
	9	10	4.78	90	3.95
	8	3	1.44	24	1.05
	7	2	0.96	14	0.61
	6	4	1.91	24	1.05
	5	2	0.96	10	0.44
	4	8	3.83	32	1.40
	3	3	1.44	9	0.39
	2	2	0.96	4	0.18
Total	**Max12/Min2**	**209**	**100.00**	**2280**	**100.00**

[12] If data on all 209 companies over 2004-2015 companies was available, the sample would give 2508 observations in total.

Table 2.2
The total number of observations and the variation of observations in the sample by year from 2004 – 2015. Notes: The statistics shown in this table was calculated by the author based on the data collected from the companies' annual reports and DataStream.

	Year	Number of companies	Freq. observation	%	Cum. %
	2004	166	166	7.28	7.28
	2005	172	172	7.54	14.82
	2006	183	183	8.03	22.85
	2007	191	191	8.38	31.23
	2008	188	188	8.25	39.47
	2009	190	190	8.33	47.81
	2010	191	191	8.38	56.18
	2011	193	193	8.46	64.65
	2012	201	201	8.82	73.46
	2013	201	201	8.82	82.28
	2014	203	203	8.90	91.18
	2015	201	201	8.82	100.00
Years of observation	12				
Number of unique companies		209			
Total number of yearly observations			2280		

To accomplish all aims of this thesis, the most data on was hand collected from the annual reports[13] - the data, which is not freely available for download, but a collection of this information requires enormous amount time and patience. Although, hand collecting required information from the annual reports was a very challenging task and time-consuming activity, the use of this data makes a distinctive contribution to the research on DB pension schemes and provides a background for a better understanding of the complex nature of DB pensions and its interaction with the company.

In particular, the first empirical study is concerned with the need to understand the role of CEOs and CFOs DB pension holdings for the funding positions of DB pension schemes. Along with the information about pension assets and liabilities, which were used to calculate the funding position of DB schemes (assets minus liabilities), the information about CEO and CFO DB pension holdings was collected from the remuneration section in companies' annual reports.

[13] Data will be discussed in detail in Chapter 5.

Using information from annual reports on directors' remuneration, it made possible to determine whether the CEO (and CFO) is a member of DB pension scheme or not and obtain details on the size of DB pension arrangements if relevant. There are two variables which represent the size of DB pension holdings. Firms disclose the *"Total Accrued"* DB pension at the end of the year which represents the value which would be paid annually on retirement and *"Transfer Value"* of total accrued pension which represents the value which the scheme member could get if he exercises the right to transfer money out of the scheme. Both variables *"Total Accrued"* and *"Transfer Value"* are divided by the CEO (or CFO) accumulated wealth in the firm. Data on accumulated wealth are obtained from BoardEx.

The second empirical study requires data about DRCs made to the schemes. The information about DRCs is not readily available and thus was also hand-collected from companies' annual reports. DRCs are different from normal contributions that the companies usually make necessary to match the present value of future benefits earned in the current year. The funding strategy of the deficit of sponsoring companies was identified through payments of DRCs purposely made to close or at least reduce the gap between the estimated value of scheme assets and projected pension obligations. DRCs defined as an amount paid in excess to normal pension contributions that the company usually make necessary to match the value of the increase in pensions to be accepted for levy purposes (PPF Deficit Reduction Guidance).

The normal pension contributions and DRCs, if any made, are reported under single figure[14]. However, those companies that paid additional contributions to the pension schemes provide supplementary notes explaining the funding recovery plan and the amount of payments made in the year (or in the previous years). Studying the supplementary notes on pension

[14] During the collection of the data it was observed that majority of companies report the combined value of pension contributions., the value of normal pension contributions plus the value of deficit reduction pension contributions, under the single figure. However, in most recent years it becomes more prevalent for companies to separate the aggregate value of pension contributions into two, normal and deficit contributions and show in the pension section to the annual report the value of regular pension contributions and cash paid in excess to reduce the deficit separately.

contributions made it possible to identify whether and how much the company paid in additional pension contributions towards deficit reduction. Although, companies do not always use "*DRCs*" to describe additional contributions towards deficit reduction, they, however, clearly state the amount of additional contributions they make to "*recover the funding levels*" or "*reduce the pension deficit*" and hence these contributions are classified as *DRCs*.

The definition of these and other control variables are discussed in greater detail in the related studies.

2.3.1. Pension funding of FTSE 350 companies

Table 2.3 reports the aggregate value of pension assets, liabilities and the deficit (the difference between pension assets and liabilities) of DB schemes sponsored by the companies in the FTSE 350 index over the 2004-2015 period. Graph 2.3. and 2.4 graphically depicts the aggregate value of pension assets and liabilities and the corresponding deficit, respectively.

As from Table 2.3, at the end of 2004, there were 166 companies in the FTSE 350 index with DB pension arrangements. The aggregate value of pension assets of 166 companies amounted to £240.3 billion in 2004, and the value of pension liabilities was estimated at £290.6 billion with an aggregate deficit of £50.3 billion At the end of 2015, there were 201 companies in the FTSE 350 index with DB pension arrangements with the aggregate value of pension assets and liabilities of £588.9 billion and £622.7 billion respectively. This represents an increase of pension assets by more than 140% of the value of pension assets and increases in pension liabilities by more than 110% of the value of pension liabilities in 2004. Although pension assets had grown at a faster rate than the pension obligations, the growth of pension assets was insufficient as the pension liabilities had consistently exceeded the value of pension assets. At the end of 2015, the aggregate deficit was estimated at £34 billion. This also means that the deficit remains persistent as underfunding is observed in all years since 2004.

While the highest funding was observed in 2007 when the deficit estimated at £12.4 billion, in the subsequent year the funding declined to £-33.2 billion. In 2009, the deficit increased further and reached nearly £67 billion. The level of deficit in 2009 was the highest during the 2004-2015 period, which was driven by the fall in equity prices and low discount rates as a result of the financial crisis that began in 2008. For the 2010-2015 period, the level of underfunding varied between (-£58.3) – (-£33.8) billions. Although it is now 10 years from the crisis of 2008/09, the deficit remains high that, according to the latest figures, estimated at £39.8 billion (The Actuary, 2019).

It is also worth noting that the funding positions of DB pension schemes in the FTSE 350 index do not deteriorate as much as for DB pension schemes in the PPF 7800 index during 2014-2015 period as was previously shown in Figure 2.1. Such difference may reflect the fact that there are companies which take actions to remove the deficit as well as companies which take more risk in respect to their DB schemes. This may therefore suggest that funding positions of DB schemes more likely to be influenced by factors beyond those directly attributable to the deficit, e.g., economic and demographic factors discussed previously in this thesis.

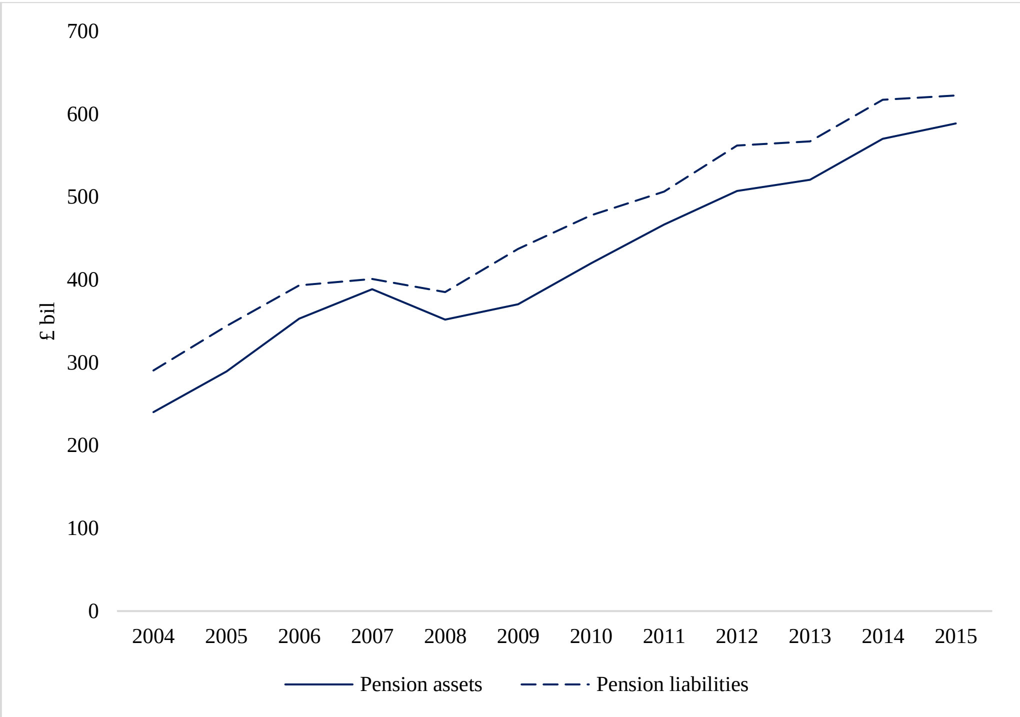
Table 2.3

The aggregate value of pension assets and liabilities and corresponding funding over the 2004-2015 period, £ billion. Notes: The statistics shown in this table was calculated by the author based on the data collected from the companies' annual reports and DataStream.

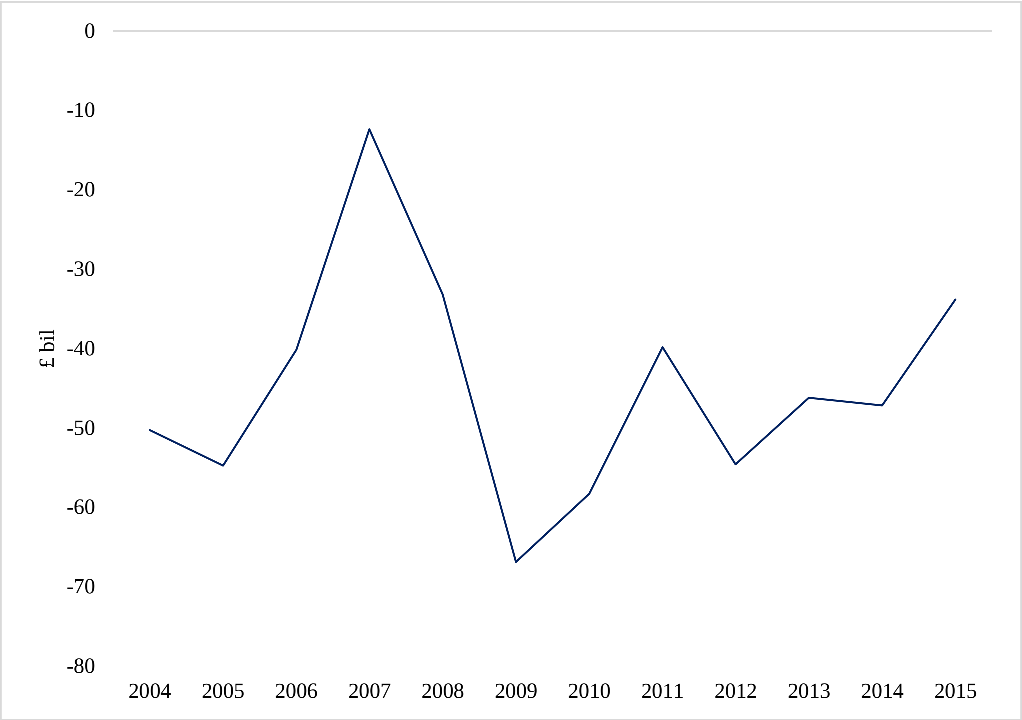
Year	Pension assets	Pension liabilities	Funding
2004	240.28	290.56	-50.28
2005	289.40	344.14	-54.74
2006	353.12	393.27	-40.15
2007	388.55	400.92	-12.37
2008	352.16	385.32	-33.16
2009	370.44	437.32	-66.88
2010	419.81	478.09	-58.28
2011	466.76	506.59	-39.83
2012	507.43	562.03	-54.60
2013	520.97	567.14	-46.18
2014	570.29	617.46	-47.17
2015	588.87	622.66	-33.80
Total	**5068.07**	**5605.51**	**-537.43**

Graph 2.3

Pension assets and liabilities over 2004-2015 period, £ billion. Notes: The graph was prepared by the author based on the data collected from the companies' annual reports and DataStream.



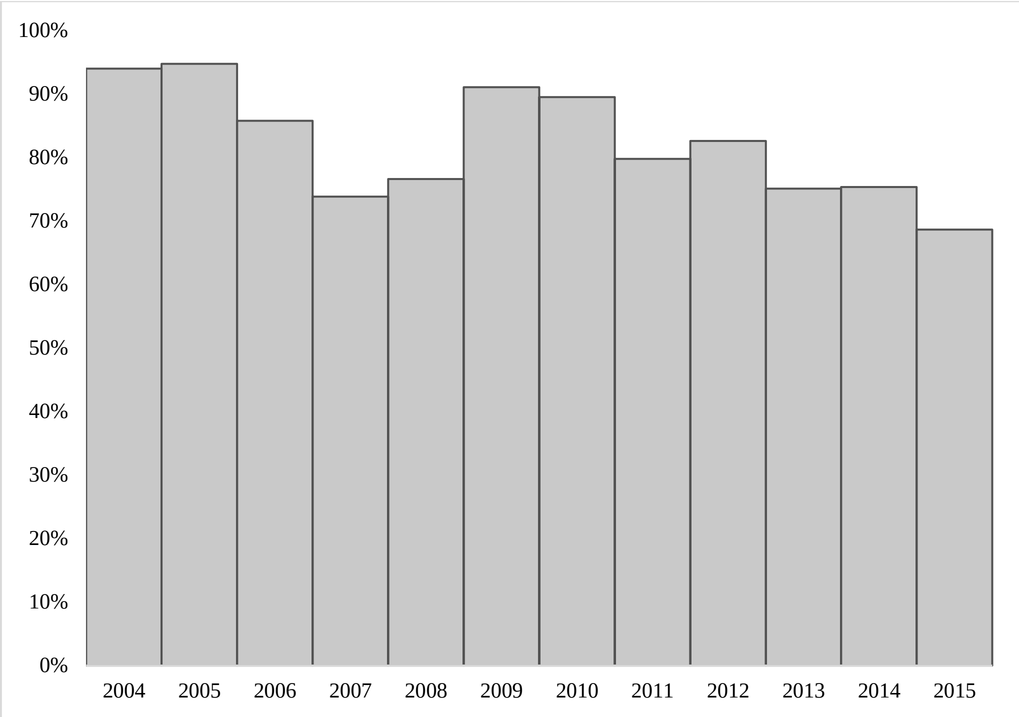
Graph 2.4
Aggregate deficit/surplus of pension schemes over 2004-2015 period, £ billion. Notes: The graph was prepared by the author based on the data collected from the companies' annual reports and DataStream.



Graph 2.5 further reports the number of schemes running a deficit. As shown in Graph 2.5, the majority of schemes were underfunded. The highest number of schemes running a deficit was in 2004-05, where about 95% of schemes in the FTSE 350 companies were in deficit, and only 5% of schemes were reported in surplus. The lowest number of schemes running a deficit was in 2015, where about three-third (68%) of companies were reported in deficit. However, it is worth noting that while the number of schemes running a surplus has been gradually increasing, the underfunding remains relatively high. The latest figures on funding levels of FTSE 350 companies reveals that the number of schemes running surplus increased further to about 50%, but the level of aggregate deficit in 2018 amounted to £39 billion that is higher than in 2015 when the number of underfunded schemes estimated at 68%. This suggests that funding has become more dispersed across companies.

Graph 2.5

% of schemes running deficit over 2004-2015 period. Notes: The graph was prepared by the author based on the data collected from the companies' annual reports and DataStream.



Chapter 3
Literature review

This chapter provides a brief review of related studies on corporate pension schemes. It starts with a revision of the literature that explains why pension schemes should be viewed as a part of the company. It then reviews the existent literature that focuses on the determinants of the funding of DB schemes. The chapter concludes with a discussion of how this thesis will contribute to the literature.

3.1. Consolidation of DB schemes with the company

DB pension schemes and sponsoring companies are separate legal entities as the pension assets are kept apart from the company. However, many researchers have come to the view that pension assets and pension obligations are considered as assets and obligations of the company themselves. For example, the early paper of Sharpe (1976) view pension obligations and assets as an integral part of the company’s balance sheet because the company is obliged to pay pensions to its employees and set aside assets to meet these obligations. Such integration also creates a pension call option that the company may exercise when there is a surplus or put option when there is a deficit in the pension scheme. Black (1980) argues that most of the risk in DB pension schemes is borne by the sponsoring companies and their shareholders that makes pension obligations to be corporate. Bulow (1981) show that pension liabilities act in the same manner as the corporate bonds: the current reduction in salary is the present value of the bond, and the future promise is the face amount of the bond (Bodie and Shoven,1983). Ippolito (1986) also views pensions as economic liabilities of the company mainly because workers make savings in the form of pension (employee) contributions with their companies in anticipation of receiving a pension upon retirement. Stefanescu (2006) also argues that the pension legislation that governs the interaction between the company and the pension scheme supports the balance sheets integration because sponsoring companies are liable for all pension liabilities which are senior to the claims of all lenders. But seniority of claims on unfunded pension liabilities is questionable when sponsoring company fails as the courts have sometimes deviated from this view (Shivdasani and Stefanescu, 2009). Although these studies suggest that pension liabilities should be viewed as the company's debt, Ralfe, Speed, and Palin (2004) argue about the complexity of this debt compared to conventional debt. In particular, they argue that pension debt is complex due to that: (1) payments are volatile as they depend on mortality rates, withdrawal rates, and other demographic features, (2) pension benefits in the UK are indexed, e.g., increase in line with rate of inflations, (3) pension promises are not traded. Ralfe, Speed, and Palin (2004), however, point out that these specific features of pension debt do not alter the underlying economics that pensions are debt for the sponsoring company.

To explain the relationship between the company and its pension schemes, Bodie, Light, Morck, and Taggart (1987) propose two diametrically opposite views: the traditional and corporate financial perspectives. The traditional perspective assumes that pension funds are separate from the company. This suggests that funding policy and assets allocation of a pension scheme should be made in the best interest of pension scheme beneficiaries without regard to either corporate financial policy or the interests of the sponsoring company and its shareholders. As such, funding strategy should be influenced by "expected future stream of employee pension liabilities," regardless of corporate financial strategy. In contrast, the "corporate financial perspective" represented by the stream of theoretical work of Black (1980), Sharpe (1976), Tepper (1981), and Treynor (1977), stresses the potential effects of a company's financial condition on its pension funding and asset allocation decisions" (Bodie, Light, Morck, and Taggart, 1987). This view has several merits including tax benefits (as demonstrated by Black (1980) and Tepper (1981)), the pension call/put options that company has and that is related to the insurance protection offered by the PBGC (studied by Sharpe (1976) and Treynor (1977)), and the financial slack analysed by Myers and Majluf (1983). Empirical findings of Bodie, Light, Morck, and Taggart (1987) and Bartram (2018) investigating whether DB plans are managed independently or integrated into the financial management of their sponsoring company support the corporate finance perspective. In particular, companies appear to manage their pension schemes as part of their overall financial strategy, since various pension scheme dimensions are found to be related to the company-specific characteristic.

The view that pensions are debt-like has also been supported by several empirical studies showing that the market also views DB pensions as a part of the company rather than separate entities. For instance, Feldstein and Morck (1983) study how unfunded pension liabilities and net pension assets affect the market value of sponsoring companies. They show that company market value reflects both pension surplus and pension deficit and that the financial market uses common standard interest rate (which is very close to the average rate used by all companies in the sample) rather than rates reported by the companies. This suggests that the financial market appears to "see-through" the manipulation of pension liabilities using interest rates. Feldstein and Seligman (1981) investigating the effect of a pension scheme's deficit on the share price find that pension deficit is incorporated into the share price suggesting that shareholders perceive the unfunded pension liabilities as corporate debt. Barth, Beaver and Landsman (1992) argue that each component of pension cost contains information regarding the company's permanent earnings potential. Examining this proposition empirically, they find that pension cost coefficients differ from one another and that the disclosure of separate pension cost components is used by market participants when they assess the company's permanent earning potential. Alderson and Chen (1987) also show an abnormal rise in share price for companies that announced to recover a pension surplus. With a focus on most recent evidence, Franzoni and Marin (2006) find that most underfunded companies earn lower subsequent returns than companies with healthier pension schemes. Jin, Merton and Bodie (2004) investigating whether the systematic equity risk reflects the risk of their pension schemes, find empirical support for his hypothesis that is consistent with the informational efficiency of the capital markets despite obscure pensions accounting disclosures. Gallagher, Mckillop and Pogue (2011) also find that pension risk is reflected into company's equity suggesting that company's pension assets and liabilities are perceived as "*the assets and liabilities of the firm itself*". Also, Mckillop and Pogue (2009) find that pension risk is incorporated in the credit rating: the greater the pension risk, the greater the probability of obtaining a lower debt rating. In a subsequent study, however, Gallagher and Mckillop (2010) find that unfunded pension liabilities are priced but not as aggressive as traditional leverage and that the pension-credit risk relation is more evident in the US and Germany, but not in the UK. These studies provide strong evidence of why the role of the company should be considered in understanding the determinants of the funding of DB schemes.

3.2. Review of related studies

A major strand of literature on funding DB schemes investigates whether and why companies may underfund or overfund their pension schemes. Building on the work of Sharpe (1976) that demonstrates that sponsoring company has a put option on the pension assets in respect of any potential deficit, Francis and Reiter (1987) argue that riskier companies are more likely to underfund their schemes because the put option becomes more valuable. Francis and Reiter (1987) also argue that companies with restrictive debt covenants are more likely to use their schemes as a source of financing by making lower contributions. Why companies may underfund their pension schemes has further been debated in the paper of Cooper and Ross (2002) that argues that capital markets imperfections may induce a company to make lower pension contributions to the scheme. In particular, they argue that if the company encounters imperfections in the capital markets when raising external funds to finance investments, the company may consider borrowing from the scheme members and payback when the company is more financially sound. In contrast, Tepper (1981) and Black (1980) show that sponsoring company has reasons to remove the risk from the pension scheme and make a large contribution as possible to take full advantage of tax benefits. Tepper and Affleck (1974) argue that the company may even consider borrowing funds to finance its pension scheme because it creates a debt tax shield without increasing the risk of the company.

Empirical studies have, however, come to the different views on whether high-debt companies, which are riskier and more likely face borrowing restrictions, underfund their pension schemes. In one of these empirical studies, Davis and De Haan (2012) analysing Dutch DB pension funds between the 1996-2005 period find that companies with high debt make higher pension contributions than those with lower debt in their capital structure. While the positive relationship between debt and pension contributions supports tax effects hypothesis that taxpaying companies would run overfunded DB pension schemes to take full advantage of tax benefits, these results contradict with the predictions of Cooper and Ross (2002) and Francis and Reiter (1987). Moreover, the findings of Davies and de Haan (2012) also contradict with those of Bartram (2018). In particular, using a sample of US companies with DB pension schemes over the 1992-2014 period, Bartram (2018) finds that both pension contributions and funding levels are lower for companies that have a higher debt in their capital structure. These findings are in line with Cooper and Ross (2002) and Francis and Reiter (1987) predictions. These findings are also in line with prior study of Bodie, Light, Morck, and Taggart (1986) that also finds that riskier companies tend to exhibit lower funding levels. This interpretation is also consistent with an earlier study of Bereskin (2009) on US companies that shows that pension contributions decline with increased bankruptcy probability and that increased bankruptcy probability impact plan funding levels as well as the choice of actuarial assumptions. Furthermore, the negative relationship between pension contributions is also consistent with the study of Cheng and Michalski (2010) that also finds that US companies contribute less when the leverage is high and when their credit rating is near the investment/non-investment grade cut-off. These findings suggest that pension contributions decisions reflect the trade-off between the benefit – reducing the pension liability, and the cost-reducing cash flows from operations. The evidence on the relationship between debt and funding of DB schemes on the companies in the UK is, however, limited. The only known research in this area is the cross-sectional study of Cocco and Volpin (2007) that finds no direct evidence between debt and pension scheme financing decisions, perhaps due to the presence of endogenous variable (Cocco and Volpin, 2007). However, estimating the instrumental variables regressions that effectively deals with the endogenous variable, it has been found that more financially constrained companies with a higher proportion of insider- trustees make lower pension contributions.

Another strand of literature investigates determinants of pension actuarial assumptions. As previously discussed, pension assumptions affect the costs of DB pensions as well as the funding position of DB schemes. The research on pension assumptions finds that discount rates, expected rates of return and other assumptions are also explained by the financial condition of the companies sponsoring these schemes. For example, in an attempt to enhance the understanding of how pension assumptions choices are made and how companies behave in response to accounting regulation, Gopalakrishnan and Sugrue (1995) examine the determinants of the choices of discount rate and the rate of salary progressions. They stated that in an efficient market, unfunded pension liabilities are similar to debt and other liabilities of a company for equity valuation and also for determining the systematic risk. The presence of a large deficit could be regarded as undesirable by corporate managers. Higher unfunded pension liability coupled with higher leverage can lead to an increase in the likelihood of technical default. Therefore, companies with large unfunded pension liabilities and leverage are likely to choose higher discount rates to lower pension liabilities. Similarly, companies with large unfunded pension liabilities are also likely to assume lower salary progression rates. Empirical results reveal indeed that the choice of the discount rate is influenced by leverage and the funding level of the scheme. These findings suggest that companies choose actuarial assumptions that are favourable to them. Asthana (1999) also investigates the effects of US companies' financial and pension profiles on their funding strategies and actuarial choices. They find that as companies become overfunded, they make conservative actuarial choices to avoid visibility costs. However, as companies become underfunded, they make more liberal actuarial choices. That is the larger the profitability, cash flow from operations, and tax liability, and the smaller the debt of a company, the higher the likelihood that the company's managers will make conservative actuarial choices to maximize contributions. Conversely, the smaller the profitability, cash flow from operations, and tax liability, and the larger the debt of a company, the higher the likelihood that the company's managers will make liberal actuarial choices to minimize contributions. Other studies also show that US companies tend to set higher discount rates and apply more aggressive return assumptions when companies' financial situation is more difficult, e.g., when they have insufficient cash holdings and generate lower profit (Bartram, 2018). Pension assumptions management helps financially distressed companies to smooth reported earnings, shift the pension costs and reduce contributions (Lew, 2008). It also has been found that companies manipulate discount rates to help inflate the scheme funding (Godwin, 1999).

The results of studies on UK companies investigating pension assumptions also provide evidence of the companies' discretion over the choice of pension assumptions. For example, Sweeting (2011) examine FTSE 100 non-financial companies over 1989– 2005. He finds no relationship between the funding of DB schemes and the choice of the discount rate but concludes that large companies use high discount rates. Li and Klumpes (2013) analyse the discount rate used by FTSE 350 companies over 1998–2002. They find that high discount rates are associated with highly leveraged companies and weakly funded pension plans. These results are in line with previous studies of Gopalakrishnan and Sugrue, (1995) and Asthana (1999). Byrne, Clacher, Hillier, and Hodgson (2007) examining assumptions used by FTSE 350 companies over 2001–2004 find that companies with well-funded plans tended to use high discount rates. However, Billings, O'Brien and Woods (2017) find no evidence that companies with high debt in their capital structure manage pension assumptions but find evidence of selective 'management' of the pension assumptions in companies weak funding positions.

Companies may also manage earnings by increasing the proportion of pension assets in equities (Gold, 2003). By investing in assets with high expected returns, the company can significantly reduce its pension contributions which financially weak companies may particularly benefit from (McCarthy and Neuberger, 2005). While the institutional structure of DB pensions creates moral hazard incentives for companies to underfund pension schemes by investing a higher proportion of pension assets into equities, Rauh (2007) find that riskier companies choose less risky pension allocations. This suggests that risk-management incentives dominate risk-shifting incentives. However, Addoum, van Binsbergen, and Brandt (2010) find that company increases the proportion of pension assets into equities when they are required to make mandatory contributions to reduce the deficit. This finding suggests that companies increase their risk-taking to avoid mandatory contributions, and such behaviour resembles gambling for resurrection. Also, Bergstresser, Desai, and Rauh (2006) provide evidence that companies manipulate earnings forecasts by assuming relatively high long-term rates of return on pension assets, and that higher assumed rates of return, in turn, drive pension asset allocation towards more equity.

Another stream of research looks beyond the financial and profitability measures of the company. For example, Anantharaman and Lee (2014) empirically analyse how two important measures of the compensation incentives of CEO and CFO, namely wealth risk sensitivity (vega) and wealth price sensitivity (delta), affect the risk-shifting versus risk-management behaviour of executives in pension schemes. Anantharaman and Lee (2014) find that compensation structure of senior management is of importance for funding of DB schemes as it drives the corporate pension policy: risk shifting by underfunding pension plans is weaker when they have a larger stake in plans that is at risk if the plan fails. Begley, Chamberlain, Yang, and Zhang, (2015) investigate the relationship between the funding of DB pensions and CEOs' incentives captured by their equity wealth, pension obligations, and other deferred obligations. They find that DB pensions are better funded in companies whose CEO accrued higher DB pensions. Further, they find that the CEO's equity wealth among financially-constrained companies is negatively associated with underfunding. This implies that when the company is near to bankruptcy, CEOs prefer to keep cash in hand as a security for debt claims. Other studies also find that higher funding of DB schemes is associated with CEOs inside debt incentives (Y Yu-Thompson, 2015; Cheng and Swenson, 2018). These studies suggest that managerial inside-debt incentives appear to be important for the health of DB schemes. Other studies also show that managers manage pension assumptions to extract higher pay. For example, Bergstresser, Desai, and Rauh (2006) find that managers are more aggressive with assumed long-term rates of return when their assumptions have a greater impact on reported earnings and when their managers exercise stock options. Comprix and Muller (2006) find that companies change the interest rate assumptions to boost earnings to increase executive compensation. Whether managers have incentives to manage pension assumptions have been previously debated in the study of Watts and Zimmermann (1990). It argued that since management remuneration schemes linked to the financial performance of the company, it creates incentives to manage the relevant accounting numbers. As a result, managers may have an incentive to exercise bias in the selection of the actuarial assumptions if they believe that higher pension liabilities (or funding deficits) will be negatively received by the capital markets and subsequently affect them personally, via reduced remuneration (Billings, O'Brien, and Woods 2017).

3.3. Contribution of this thesis

This chapter provided a brief overview of the literature on corporate DB pension schemes. The amounts of literature highlight that DB pensions have been well researched. However, several gaps have been identified. First, the existing literature on the role of managerial incentives on pension funding tends to focus on US companies. To examine the role of managerial incentives on pension funding in the UK is interesting because the pension regulation in the UK differs from the pension regulation in the US. In the UK, the pension benefits of members of DB pension schemes are protected by the Pension Protection Fund (PPF) up to a compensation limit. This means that the PPF will pay pension benefits (subject to the compensation cap) if the company bankrupts and there are insufficient funds. This may suggest that managerial incentives might differ even for the managers with inside debt.

Second, there is no, due to no data available for download, research that examines the funding policy of deficit of DB schemes. However, there is an explicit need to understand the underlying motives of making these DRCs given the importance of those contributions on pension funding.

Third, researchers have primarily focused on the role of CEO inside debt incentives. However, prior research suggests that CFOs inside-debt incentives might be more influential than those of CEOs (Anantharaman and Lee, 2014). Therefore, more research is needed to understand who contribute most to the funding of DB schemes.

Fourth, studies examining the relationship between pension contributions and the corporate structure of the company has neglected to consider the role of the pension regulation. This possibly explains why the existing research produce contrasting results without there being provided reasons why companies are more likely to be inclined to underfund or overfund their pension schemes (Davies and de Haan, 2012; Bartram, 2018). However, the pension regulation must be regarded as an important motivator or, instead, demotivator for companies to use pensions as a source of funding.

Fifth, while existing studies on pension contributions focus on total pension contributions, pension contributions consist of regular pension contributions which companies should make to cover the regular cost and additional pension contributions which companies should make to reduce the deficit. However, companies are not expected to make lower pension contributions when they lack the cash or face borrowing restrictions except for DRCs, which can be set up that best suit their financial needs. As there is a fundamental distinction between two types of pension contributions, it is important to examine what factors influence each type and whether companies manage DRCs, regular contributions or both.

This thesis aims to contribute to the literature by addressing the gaps discussed above.

Chapter 4

Managers' inside-debt incentives and the funding levels of Defined-Benefit schemes

Understanding the determinants of funding levels of DB pension schemes has been a major focus in research on corporate pension schemes. To date, research on the determinants of the funding levels has tended to focus on the role of companies that sponsor DB pension schemes (Bartram, 2018; Davies and de Haan, 2012; Bereskin, 2009; Cooper and Ross, 2002; Bodie, Light, and Morck, 1987; Francis and Reiter, 1987; Cheng and Michalski, 2010; Lew, 2008; Braswell, Chang, and Hsieh, 2017). In aggregate, the findings suggest that company-level factors such as financing constraints and profitability among others influence the funding levels of DB schemes, pension assumptions or pension contributions. These studies show that companies integrate their DB schemes in their overall financial management and that the funding decisions of schemes are part of the company's whole portfolio of corporate decisions.

As the CEO influences the major corporate decisions (Adams, Almeida, and Ferreira, 2005), the CEO may be a further important determinant of the funding level. While the CEO is appointed to act in the best interests of the company, the separation of ownership and control gives rise to agency costs (Jensen and Meckling, 1976; Fama and Jensen, 1983). To address the agency costs, boards seek to remunerate CEO with incentive plans to ensure that CEO decisions best reflect shareholder goals (Core, Guay, and Larcker, 2003; Murphy, 1999; Davila and Penalva, 2006). Whereas incentive plans encourage the shifting of risk to debtholders, boards also seek to include inside debt to reduce risk-inducing effects (Jensen and Meckling, 1976; Edmans and Liu, 2011). Consistent with this goal, a strand of empirical research shows that inside debt leads to avoidance of risk in company (Deng, He, Kong, and Zhang, 2019; Bennett, Guntay, and Unal, 2015; Srivastav, Armitage, Hagendorff, and King, 2018; Freund, Latif, and V. Phan, 2018; Kabir, Li, and Veld-Merkoulova, 2013; Cassell, Huang, Sanchez, and Stuart, 2012; Sundaram and Yermack, 2007). Other studies also show that companies in which CEOs are paid with inside debt have a lower cost of capital suggesting that bondholders are aware of risk-avoiding incentives created by inside debt (Kabir, Li, and Veld-Merkoulova, 2013).

This study builds on the agency theory to examine whether CEO inside debt incentives generated by DB pensions are associated with higher funding levels of DB schemes. DB pension is viewed as inside debt because the pension of DB type consists of the company's promise of cash in the future. CEO more likely will get the promised level of DB pension when there are sufficient funds in the pension schemes – when the pension assets equal to or exceed the value of pension promises. However, when there is a deficit, e.g., shortage of pension assets, the CEO risks losing a share of the pension accruals. For instance, if the company bankrupts, the CEO would stand in line with other debtholders and is bound to accept what is offered rather than what is promised. Therefore, inside debt becomes unsecured when there is a deficit, and the CEO can be seen as an unsecured creditor of the company.

However, as the CEO may influence all major decisions, the CEO could also initiate decisions to prevent the scheme from being underfunded or restore the funding levels if there is a deficit. By maintaining healthy DB scheme, the CEO pension becomes more secured. In contrast, CEOs with alternative pension arrangements such as DC and cash, which are not debt-like like DB pensions, may show more risk-taking behaviour because financing of DB scheme is costly for the company that may directly influence CEO (through lower remuneration for example). Evidence from past research shows that CEOs manipulate pension assumptions and adjust pension investment strategy when they have the interests to do so (Bergstresser, Desai, and Rauh, 2006; Comprix and Muller, 2006; Watts and Zimmermann, 1990) – actions that directly influence the funding levels of DB schemes. Other studies also show that CEOs benefit from lower pension contributions by getting higher compensation, especially when CEO compensation is linked/more sensitive to cash flows from operations (Cheng and Swenson, 2018).

While CEOs inside-debt incentives are believed to be important, this study further examines the inside-debt incentives of CFOs and their impact on the funding levels of DB schemes. There are several reasons why it is also important to focus on CFOs. First, corporate decisions are often made in teams, which can change the decision-making dynamics (Hsieh, Wang, and Demirkan, 2018; Aggarwal and Samwick, 2003) and thus both CEO and CFO, as leaders with the most valued positions in the company, should be viewed as *"one team with two faces"* (Tulimiere and Banai, 2010). Second, similar to CEOs, the holdings of DB claims are also remarkable among CFOs that could also instigate CFOs to look after DB schemes to regard their personal financial interests. For example, 44% of CFOs in the sample hold DB pensions with an average value of pension of £86.85 thousand or 4.24% of their total accumulated wealth. In comparison to CFO, there are 46% of CEOs in the sample who hold DB pensions with an average value of pension of £177.74 thousand that represent 3.64% of their total accumulated wealth. Third, CFOs are responsible for the financial management and CFOs incentives in particular, due to financial expertise and responsibilities, could be more influential in the decision setting. Prior studies provide evidence that suggests that the incentives of CFOs are more influential than incentives of CEOs in explaining earnings management (Jiang, Petroni, and Wang, 2010; Chava and Purnanandam, 2010) and the pension funding (Anantharaman and Lee, 2014) inferring that CEOs may rely on CFOs when executing their decisions. However, on the hand, the literature also argues that CEO may exert influence on various decisions through dismissal of CFO who does not perform in accordance with the preferences of CEO (Mian, 2001; Fee and Hadlock, 2004). In a study examining the reasons behind the CFO involvement in accounting manipulation, Feng, Ge, Luo, and Shevlin (2011) find that CFOs manipulate financials due to pressure from CEOs to manage earnings and not because they seek immediate personal financial benefit from their equity incentives. Following these conflicting arguments, this study investigates whose inside debt incentives are associated with the funding levels of DB schemes. Focusing on both CEOs and CFOs will enrich the understanding of how managerial incentives influence the funding levels of DB schemes and in whose domain the funding policy falls.

Following the empirical studies discussed above and prior theoretical work, this study hypothesizes that funding levels of DB schemes are positively related to managers (CEOs and CFOs) DB pensions. As argued above, the presence of DB pensions may induce CEOs and CFOs to take less risk with respect to DB schemes by keeping the scheme better funded. Using a sample of UK companies with DB pension arrangements and remuneration data of their CEOs, this study finds strong support for this hypothesis. In particular, this study finds that CEOs DB pensions positively associated with the funding levels of DB schemes. These findings imply that DB pension schemes are better funded when CEOs participate in DB schemes, e.g., when they have DB pensions, as consistent with the stated hypothesis. However, the regression analysis fails to find a relationship between CFOs DB pensions and the funding levels of DB schemes implying that CFOs inside debt incentives are less influential than those of CEOs. Taken together, these findings suggest that CEOs incentives play a more important role than CFOs incentives. Although CFOs are in charge of financials, it appears that CEOs exert significant influence over CFOs decisions to induce CFOs to make decisions to regard the interests of CEOs which are not always in interests of CFOs themselves.

This study further documents that CEOs DB pensions are associated with higher funding for older CEOs (CEOs who approach closer to retirement). These findings imply that CEOs seek to secure their DB pensions as they get near to retirement. Overall, these results highlight the importance of CEO inside debt incentives for DB schemes.

This study does not test whether the funding position of DB schemes is increasing in the age of a CFO with DB pension because CFOs are on average 4 years younger than CEOs and there is no insufficient number of observations for the sub-sample of CFOs approaching closer to retirement.

This research makes several contributions to the literature. First, this study contributes to the literature on the determinants of funding levels of DB schemes by examining whether funding levels are related to CEO inside debt incentives plans (Begley, Chamberlain, Yang, and Zhang, 2014; Y Yu-Thompson, 2015). As CEO plays an important role in corporate financing decisions, CEO incentives are vital at understanding the complex relationship between the company and the pension scheme. While previous research has tended to focus on the role of companies (Davis and de Haan, 2012; Bartram, 2018 and others), this study shows that CEOs inside debt incentives also influence the funding levels of DB schemes. These findings reveal important implications for DB schemes, and regulators and policymakers can use these results to respond to the problem of CEO disincentives when the CEO has no DB pensions to encourage proper scheme management.

Second, this is the first study that examines the relationship between CEOs inside debt incentives and funding levels of DB schemes in the United Kingdom. The regulation of occupational pension schemes in the United Kingdom is specific regarding how companies tackle the deficit – companies may consider long periods to eliminate the deficit in the scheme, as previously discussed in Chapter 2. First, such regulatory flexibility assures that regulation does not influence the managers attitude towards DB scheme with no inside debt incentives. For instance, if the pension regulation is stricter in a sense that it would require companies to remove the underfunding within a short period of time (e.g., 3 years), the managers with no inside debt incentives are also more likely to take actions to remove the deficit due to the regulatory requirements. Therefore, when the deficit funding requirements are strict, all managers, irrespective of their incentives, may take actions to bring and keep the scheme fully funded to avoid regulatory intervention or penalties. Second, the results of this study reflect the effects of the existing pension regulation. Although this research focuses on UK companies, the results of this study can also apply to companies with DB pension arrangements in other countries with pension regulation similar to the UK, such as the US. As evidence of applicability, these study findings are consistent with prior studies on US companies examining the role of CEO inside debt incentives for funding of DB schemes (Begley and Chamberlain, 2014; Y Yu-Thompson, 2015).

Third, this study contributes to the literature on CEOs incentives highlighting the usefulness of inside-debt in reducing the risk-taking behaviour, as consistent with prior literature (Deng, He, Kong, and Zhang, 2019; Bennett, Guntay, and Unal, 2015; Srivastav, Armitage, Hagendorff, and King, 2018; Freund, Latif, and V. Phan, 2018; Kabir, Li, and Veld-Merkoulova, 2017; Cassell, Huang, Sanchez, and Stuart, 2012; Sundaram and Yermack, 2007 and others). As the popularity of DB pensions decreases, boards and other stakeholders should seek an alternative form of compensation to avoid excessive risk-taking by the CEO and protect the interests of remaining DB members.

Fourth, this study contributes to the literature on the opportunistic behaviour of CEOs by documenting that CEOs tend to be more short-term oriented as they approach retirement. This is consistent with prior research that shows that shorter career horizon causes CEOs to act myopically (Barker and Mueller, 2002, Zona, 2016; Dechow and Sloan, 1991; Cho and Kim, 2017 and others). However, the DB element of CEO compensation induces CEOs to reduce the deficit in DB schemes to preserve their DB accruals in the company. This conclusion is consistent with prior study findings by documenting that DB pension causes CEOs with short career horizon to reduce R&D to secure their DB pensions (Kabir, Li, and Veld-Merkoulova, 2017).

Fifth, this study provides new evidence on the interactive relationship between DB pensions and companies with single-schemes suggesting that CEOs with DB pensions are particularly concerned about the funding of the scheme in which they participate. This has implications for other DB schemes if there is any. This study also demonstrates that the board, policymakers, regulators and investors should recognize the contrasting incentives of CEOs with alternative pension arrangements and the potential implications for the pension scheme members and the company in the future. To recognize these contrasting incentives is important, particularly when DB pensions gradually disappear, and companies offer their CEOs to participate in DC schemes or receive cash in lieu of pension contributions.

Lastly, this study also contributes to the literature on the determinants of funding levels of DB schemes by examining whether funding levels are also related to CFO inside debt incentives. The results reveal that CFOs inside debt incentives are less important than those of CEOs. These findings may help board, policymakers and regulators understand the roles of CEOs and CFOs play in the company setting and in the funding policy of DB schemes. This study also contributes to the growing literature on the influential role of CEOs (Feng, Ge, Luo, and Shevlin, 2011). Moreover, these findings have implications for current corporate governance reform and highlight the need to improve on the current corporate governance system.

The remainder of this chapter is organised as follows. Section 4.2 develops hypotheses. Section 4.3 describes the research design and Section 4.4 presents results. Section 4.5 concludes.

4.2. Hypothesis development

CEO is the most senior manager who is in charge of the company and thus wields significant influence over the corporate decisions (Adams, Almeida, and Ferreira, 2005). Because CEO's decisions are sensitive to his/her incentives (Fama and Jensen, 1983), this study predicts that funding of DB schemes is related to CEO's inside-debt incentives.

DB pensions may incentivise managers to take less risks because of the inside debt nature of these claims (Edmans and Liu, 2012). In a DB scheme, the CEO expects to receive a pension typically linked to final or average salary, and the company is responsible to deliver the promised level of pension when CEO retires. CEO usually makes annual contributions defined as a certain percentage of his salary in return to the future stream of retirement income. Such "*pay me now – I will pay you later*" relationship makes CEO creditor of the company because if the company bankrupts CEO would stand in line with other debtholders. In this case, the CEO is bound to accept whether payments are available for them. Thus, the CEO with DB pensions could be more incentivised to look after DB scheme and keep the scheme better funded. By having a financially healthy scheme, CEO reduces the overall risk of the pension scheme, improves the outlook of the company as well as places the company in a better situation to honour all the pension claims in full simultaneously protecting himself from the risk of losing his pension.

However, CEO with DC or cash arrangements may exhibit contrasting behaviour from the CEO with DB pensions. For CEO with DC or cash pensions, the company makes annual contributions to the CEO's personal pension fund or pays cash in place of pension contributions directly to the CEO. After making these contributions, the company has no further responsibility and CEO holds no pension claims. Having no pension claims may encourage the CEO to take more pension risks by making lower pension contributions to the scheme. By managing the contribution policy of schemes, the CEO can reserve more funds available for investments and dividends payouts as well as for higher remuneration. While both DB and DC schemes along with cash arrangements intend to provide the CEO with a retirement income, only DB pensions expose the CEO to the possibility of a loss of personal wealth. Thus, DB pensions more likely to incentivise the CEO to be prudent concerning DB schemes while DC or cash pensions more likely to encourage the CEO to take more risk.

However, the extent to which CEOs with DB pensions may care about the scheme may also depend on the sensitivity of CEOs to pension losses. In the United Kingdom, the PPF protects the interests of the scheme members. If the company bankrupts, the PPF guarantees to pay pensions but only up to a certain amount (compensation cap). Such protective measures are good for the pension scheme members but could create conflicting incentives in the CEOs with DB pensions of different sizes due to the differences in risks of the pension claims. For example, CEO with DB pension accrued up to compensation cap losses only 10% of the compensation cap while CEO with DB pension accrued above the compensation cap losses 10% plus pension accrued above the cap[15]. This means that CEOs with the largest pensions could face the largest losses. Thus, CEO with DB pension above the compensation cap can be more sensitive to pension risk than CEO with DB pension below the compensation cap.

Building upon agency theory, this study hypothesises that, as CEO DB pension leads to risk avoidance in the pension schemes, funding levels of DB schemes positively associate with CEO DB pension. However, taking the regulatory feature of UK pension schemes, this study predicts that funding levels of DB schemes positively associate only with CEO DB pension accrued above the compensation cap as lower funding levels expose the CEO to the possibility

[15] For example, if CEO accrued DB pension of £40,020 a year, his pension would be reduced to a minimum of £36,018 a year (compensation cap limit from 2019 is £40,020 and DB members are entitled to receive only 90% of the compensation cap). For CEO with DB pension of £100,000 a year, the loss in pension would be £63,982 a year compared to £4,002 for CEO with DB pension of £40,020.

of losing a higher portion of the accrued pension when the pension exceeds the compensation cap.

Hypothesis 1: Funding of DB schemes is positively related to CEO DB pensions accrued above the compensation cap.

CFO also may wield significant influence over the corporate decisions due to his/her financial expertise and responsibilities. For example, Florackis and Sainani (2018) argue that the role of the CFO has evolved considerably and has expanded beyond the traditional controllership and compliance functions, but the role of CFO has received much less attention in the literature compared to CEO. Investigating how CFOs matter to corporate financial policies, Florackis and Sainani (2018) find that a CFO has an ability to influence financial decision-making. Other studies provide evidence that suggests that the incentives of CFOs are more influential than incentives of CEOs (Jiang, Petroni, and Wang, 2010; Chava and Purnanandam, 2010; Anantharaman and Lee, 2014) inferring that CEOs may rely on CFOs when executing their decisions. Because CFO's decisions may also be sensitive to his/her incentives, this study predicts that funding of DB schemes is also related to CFO's inside-debt incentives.

Hypothesis 2: Funding of DB schemes is positively related to CFO DB pensions accrued above the compensation cap.

While DB pension may incentivise managers to take actions to bring and keep the pension scheme fully funded, it is conceivable that age may further influence this relationship.

Previous studies have well documented the change in manager behaviour as he gets closer to retirement. For example, it has been found that CEO nearing retirement tend to spend less on research (Barker and Mueller, 2002, Zona, 2016; Dechow and Sloan, 1991), make fewer innovations (Cho and Kim, 2017) and reduce the capital expenditure (Conyon, 2006; Cheng, 2004). CEOs with shorted career horizon also associate with higher earnings management (Ali and Zhang, 2015; Kalyta, 2009b; Davidson Xie, Xu and Ning, 2007) and lower firm valuation and higher levels of information risk (Antia, Pantzalis, and Park, 2010). Universally, these studies suggest that managers approaching retirement are less incentivised to invest in projects whose payback comes after their retirement and instead behave in a way that increases the benefits in the short-run.

The age may also influence the link between DB pension and funding position of DB schemes as Sundaram and Yermack (2007) argue that as manager approaches closer to retirement, the importance of pension also increases. As pension become more important, having a DB arrangement can make the manager more cautious about the deficit in the DB scheme as underfunding increases the risks of losing the pension. As a result, older manager with DB pensions more likely to make decisions that would positively influence the funding levels of DB schemes to maximize the prospect of receiving their pensions in full. Prior study indirectly supports these conjectures by documenting that DB component of executive compensation leads older CEOs to decrease the R&D (Kabir, Li, and Veld- Merkoulova, 2017) possibly suggesting that CEO with DB pension tend to reduce the deficit at the expense of R&D. Therefore, the third hypothesis predicts that the funding position of DB schemes is increasing in the age of a CEO with DB pension above the compensation cap as CEO becomes more cautious about the security of DB pension as he gets closer to retirement.

Hypothesis 3 (CEO age hypothesis): the funding position of DB schemes is increasing in the age of a CEO with DB pension above the compensation cap as CEO becomes more cautious about the security of DB pension as he gets closer to retirement.

The age hypothesis has been dropped for CFOs because CFOs are on average 4 years younger than CEOs, and there is insufficient number of observations for the sample of CFOs approaching closer to retirement.

4.3. Research design

4.3.1. Sample

This study focuses on the companies in the FTSE 350 index (Chapter 2 explains why the FTSE 350 index has been chosen as the primary data source). The initial sample contains information on funding levels of DB schemes on 211 companies and remuneration on 414 unique CEOs and 453 unique CFOs over the 2004-2015 period. However, there is some missing information on other CEO-, CFO-, the company- and pension scheme-specific variables that reduces the initial sample. Moreover, as the compensation cap was first introduced in the 2005/06 year, this study uses a sample covering the 2006-2015 period in the main analyses and full sample covering the 2004-2015 period for robustness check. Since the analysis also includes company-specific characteristics, the analysis is conducted using non-financial companies. The reason for excluding financial companies from the sample is due to the excessive leverage that is normal for the financial institutions but does not have the same meaning for non-financial companies, where high leverage more likely indicates distress (Fama and French, 1992). Exclusion of financial companies further reduces the sample by 25 companies. However, the results remain robust to the inclusion of financial companies in the sample (this will be discussed later in this chapter).

Depending on the choice of independent variables, the 2006-2015 sample consists of cross-sectional time-series data of at least 998 company-year observations for at least 126 non-financial companies. The full sample consists of cross-sectional time-series data of at least 1134 company-year observations over the period 2004-2015.

4.3.2. Variables

Dependent variable

The dependent variable (*FR%*) is the ratio of pension assets to the pension liabilities represented in percentage. The *FR%* below 100% indicates that the pension scheme is underfunded, while *FR%* of 100% or above indicates that the pension scheme is sufficiently funded and able to pay the pensions in full. Lower *FR%* translates to a higher deficit in the scheme that raises the scheme risk as the company may be unable to pay the pension liabilities in full. This study draws on data on the current market value of pension assets and future liabilities from DataStream and companies' annual reports to compute the *FR%*. The latter data source has been used to fill the gaps in missing data obtained from DataStream. The information on the current market value of pension assets and future liabilities has been widely used in prior studies on DB pensions to measure the financial health of the pension schemes (Begley, Chamberlain, 2014; Yang and Zhang, 2015; Rauh, Stefanescu and Zeldes, 2013; Ponds, Severinson and Yermo, 2011; Kroon, Wouters and Carvalho, 2017; Inkmann, Blake and Shi, 2015; Chen, Pelsser and Ponds, 2013).

Managers' inside-debt incentives

Managers' inside-debt is the accrued value of DB pension. There are two measures of CEO and CFO DB pensions: the annual value of DB pension (*Annual-pension*) and transfer or total (*Total-pension*) value of DB pension. *Annual-pension* is the value of DB pension that the CEO or CFO would expect to receive each year after he retires. *Total-pension* is the value of all future pensions accrued to date and is the value that the CEO or CFO could get if he exercises the right to transfer money out of the scheme. This study uses both *Annual-pension* and *Total-pension* to check the sensitivity of results to different measures of DB pensions. Also, there are two ways how to measure the size of DB pension: in pound value of DB pension or as a ratio of DB pension relative to the CEO or CFO total wealth. This study focuses on the latter as this measure better reflects the importance of DB pension for CEO or CFO.

To account for CEOs or CFOs who accrued pensions above the compensation cap, this study introduces an indicator variable *above-CAP-member*. Variable *above-CAP-member* takes the value of 1 if CEO or CFO DB pension exceeds the compensation cap and 0 otherwise.

The data on CEO and CFO pension remuneration has been collected from financial notes to the companies' annual reports. Information on CEO and CFO total wealth has been obtained from Boardex that defines total wealth as the market value of stock plus the intrinsic value of options.

Single and multiple DB schemes

Companies may have more than one DB pension scheme. For multiple pension schemes, the *FR%* represents the average *FR%* of all schemes as companies report the pension-related information at the aggregate level. Existence of multiple schemes adds complexity in examining the role of CEO and CFO inside-debt incentives on the funding of DB schemes as CEO or CFO may care more about the scheme in which he participates and less about other schemes. Conversely, the pension scheme in which the CEO or CFO participates may show higher funding levels compared to other pension schemes in which the CEO and CFO has no DB pension. As the average *FR%* can be less sensitive to managers DB pensions, this study introduces an indicator variable *Single-scheme* that equals 1 if the company has only one DB scheme and 0 otherwise.

However, including *Single-scheme* is also important in its own. *Single-scheme* is typically large as all eligible employees participate in one scheme. Large schemes have better governance, less operational costs and more effective investment strategies (DWP White Paper, 2018). In contrast, the company that sponsor multiple schemes tend to have smaller individual schemes as employee participates in one of several schemes based on the specific participation requirements (e.g., by operational or geographical characteristics, etc.). While large schemes benefit from economies of scale, small schemes experience lack of access to the skills and expertise necessary to achieve a comparable level of returns and face higher administration and investment costs (Stewart and Yermo, 2008; Bikker and De Dreu, 2009; Dyck and Pomorski, 2011). Therefore, this study predicts that company with *Single-scheme* shows higher *FR%* than a company with multiple schemes.

The information on whether or not a company has only one DB pension scheme has been collected from the company's annual report.

Other variables

This study includes several other variables to capture the effects of other CEO and CFO characteristics and company and pension scheme-specific factors on the funding of DB schemes.

CEO and CFO characteristics

Other CEO and CFO characteristics include tenure, age, accounting background and education. Managers' tenure is a widely used measure of managerial power that represents the CEO's or CFO's length of service in the company (Finkelstein and Hambrick, 1989; Hambrick and Mason, 1984). How tenure influences the funding is explained as follows. First, long-tenured managers develop the company-specific human capital (Harris and Helfat, 1997) that is more difficult for the board to monitor (Lado and Wilson, 1994). As a result, manager have greater discretion in resources allocation and decision making. Second, long-tenured managers more likely to have DB pensions as DB pensions were a common form of retirement arrangements until recently. Having DB pensions more likely to make the CEO and CFO to be more cautious about the funding of the DB scheme and make necessary decisions to ensure the recipience of the promised level of pensions. Moreover, empirical evidence suggests that CEOs tend to manage earnings more in the early years due to career concerns (Ali and Zhang, 2015). As such, new CEOs may increase profitability by reducing pension contributions to favourably influence the market perception of their ability. Thus, taking together it is expected that tenure positively associates with *FR%*. The study separately controls for the CEO/CFO tenure in role (*Role-tenure*), tenure in the company (*Company-tenure*) and time on board (*Board-tenure*). Due to hidden multicollinearity issues, this study also separately controls for the CEO age (*Age*) in regressions examining hypothesis 1. For the CEO age hypothesis (hypothesis 3), CEO *Age* is one of the key variables of interest. This study uses the log of *Role-, Company-, Board-tenure* and the log of *Age*.

This study also controls for the effect of whether or not the CEO has an accounting education (*Accounting-background*). CEO with accounting background has more accounting/finance knowledge, and it is argued that frauds occurring during the pre-Sarbanes-Oxley Act of 2002 (SOX Act) period may have been avoided if CEOs had accounting background (Hu, 2006).

Having an accounting background may encourage more accurate financial reporting due to accounting knowledge and less financial manipulation to avoid implications implemented by the SOX Act. Existing literature suggests that companies managed by the CEOs with financial/accounting experience provide more accurate earnings information and higher quality financial statements (Jiang, Zhu, and Huang, 2013; Matsunaga and Yeung, 2008). Therefore, it is expected that CEO *Accounting-education,* which takes the value of 1 when CEO has accounting education or previously served as CFO and 0 otherwise, positively associates with *FR%* by maintaining more accurate pension accounting and the level of pension contributions.

Company characteristics

This study also captures the effects of the company size, borrowing capability and profitability on the funding of DB schemes. Larger companies are likely to have more resources and higher leverage capability (Wilden, Gudergan, Nielsen, and Lings, 2013). Some studies also provide evidence that larger companies are more profitable (Lee, 2009). As a result, the size could be an important determinant of the company's ability to make pension contributions. Therefore, it is expected that DB schemes are more financially sound in larger companies. This study controls for the size of the company (*Company-size*) measured by the pound value of total assets. A natural logarithm is taken to address the issues with normality. Prior studies find that the size of the company positively relates to the size of pension contributions (Davies and de Haan, 2012) and funding levels of pension schemes (Bartram, 2018). Financial constraints also may influence the ability of the company to fund the pension scheme as financially constrained companies are likely to have less easy access to capital markets (Acharya, Almeida, and Campello, 2007; Dhaliwal, Li, Tsang, and Yang, 2011). As a result, financially constrained companies may have stronger incentives to reduce pension contributions to have the resource available for the company's needs (Cooper and Ross, 2002). In line with this theoretical work, empirical studies find that financially constrained companies associate with lower pension contributions and funding levels (Bartram, 2018) and with more aggressive pension assumptions (Bartram, 2018; Bergstresser, Desai, and Rauh, 2006; Lew, 2008) that simultaneously reduce cash contributions and funding levels. Consequently, pension schemes in financially constrained companies are likely less funded. Following previous studies (Bartram, 2018), financial constraint is measured as the ratio of total liabilities to the market capitalisation plus total liabilities (*Leverage*). The profitability is another determinant of the ability of the company to fund their pension scheme because more profitable companies have more financial resources to make higher pension contributions to keep the pension scheme better funded. Therefore, it is expected that company profitability, as measured by the return on the company's assets (*ROA*), positively associate with *FR%*. A study by Davies and Haan (2012) finds that more profitable companies tend to contribute more to pension schemes. Another important determinant of the funding is dividend payouts since it is argued that companies may be more inclined to pay out cash to equity holders and either underinvest (due to a debt-like overhang of pension liabilities) or invest in risky projects (due to risk-shifting) (Webb, 2007). However, a deficit in DB schemes has become an issue for many companies and the regulators, protecting the interests of the scheme members, may consider intervening into the management of the scheme if the company does not take necessary actions to improve the funding. As a result, the company may consider paying higher pension contributions to reduce the deficit when it has more free funds to avoid the involvement of the regulator into the management of the scheme. Reducing deficit also helps to lower the cost of capital, improve the credit rating and increase the earnings that can be beneficial for the shareholders themselves in the long-run. Therefore, it is expected that companies paying higher *Dividends* positively associate with the *%FR*. A study of Bunn, Mizen and Smietanka (2018) finds that additional pension contributions towards deficit reduction negatively associate with dividends implying that shareholders make up the fund's shortage. This study also controls for cash which is defined as the ratio of cash or equivalent and short-term investment to total assets (*Cash*).

Pension scheme characteristics

This research also controls for the pension scheme' specific characteristics. Specifically, it controls for the number of years of DB scheme closure to future accruals (*Closure-to-FA*). Closing DB scheme to future accruals might appear attractive to reduce risks prevalent in DB schemes as well as the costs of running the scheme. Moreover, the future of the closed DB scheme becomes more evident as it becomes possible to project the scheme's upcoming benefit payments with much greater certainty. However, companies closing DB schemes suffer the loss of finances because they lose pension contributions from employees that could make the problem of underfunding more severe. First, after the closure, the company more likely consider switching to bonds which offer lower returns. That means that to keep the scheme fully funded, the company has to increase the pension contributions as the company still need to honour the commitments made to current and past employees. It is calculated that since the closure of the pension scheme to new members, contribution rates have almost doubled (Herzenberg and Snuggs, 2013). Lower asset performance is also exacerbated by the loss of returns on pension contributions that new members would have been making had the scheme not been closed. Second, since companies no longer able to share the cost of DB pensions with their employees (e.g., by increasing employee contributions, increasing retirement age, reducing the benefits or switching from final salary to career average), companies may take more risk by pursuing risky investments to reduce the pension contributions and transfer the risk from the company to pension scheme members. In aggregate, the potential implications offset the benefits of scheme closure to future accruals. Therefore, it is also might be expected that *Closure-to-FA* negatively relates to *FR%*. Also, companies with more mature scheme could take more risks as there is a higher proportion of immediate obligations. Therefore, more mature schemes, as measured by the ratio of pension benefits paid out of the scheme/s to the total value of pension liabilities (*Maturity*), more likely to show lower funding levels. In line with this prediction, a study by Davies and de Haan (2012) finds that companies with more mature schemes pay lower pension contributions. The last variable of this study controls for the scheme equity holdings (*Equity%)* defined as the percentage of pension assets invested in equities. Companies can take more pension risk by increasing equity holdings. For example, a higher share of pension assets in equities decreases the amount of pension contribution needed from the company (Gold, 2003). Consistent with this argument, empirical studies find the negative relationship between equity holdings and pension contributions (Davies and de Haan, 2012) and positive relationship between equity holdings and expected rates of return (Bergstresser, Desai, and Rauh, 2006) that allow companies to make and justify lower pension contributions. Therefore, consistent with the previous studies, it is expected that *Equity%* negatively associated with *FR%*.

The data on CEO and CFO specific-characteristics such as *Role-tenure*, *Company-tenure*, *Board-tenure*, *Age* and *Accounting-background* is obtained from BoardEx database. The information on *Accounting-background* (education) has been also obtained by screening the CEO profile online (e.g., using Linkedin or other internet resources) when it was impossible to determine the CEO accounting background from BoardEx. The company-specific data such as *Company-size*, *Leverage*, *ROA*, *Dividends* and *Cash* are obtained from DataStream database. Information on pension scheme characteristics such as *Single-scheme*, *Closure-to-FA* and *Maturity* is hand collected from companies' annual reports. Data on *Equity%* is downloaded from DataStream, but companies' annual reports are also used to fill the gaps in the missing data.

Table 4.1 reports the names of the all variables used in this study, their definitions and the data sources.

Table 4.1
Variables definitions and data sources.

Variable	Definition	Data source
CEO characteristics		
CEO-Annual-pension	CEO annual DB pension to CEO total wealth, %	companies' annual reports/ BoardEx
CEO-Total-pension	CEO total DB pension to CEO total wealth, %	companies' annual reports/ BoardEx
CEO-aboveCAP-member	indicator variable that takes the value of 1 if CEO pension exceeds the compensation cap and 0 otherwise	companies' annual reports
ln (CEO-Role-tenure)	log number of fiscal years of CEO in the company as CEO	BoardEx
ln (CEO-Board-tenure)	log number of fiscal years of CEO on the board	BoardEx
ln (CEO-Company-tenure)	log number of fiscal years of CEO in the company	BoardEx
ln (CEO-Age)	log CEO age	BoardEx
Accounting-background	indicator variable that takes the value of 1 if CEO has accounting background or previously served as CFO and 0 otherwise	BoardEx
CFO characteristics		
CFO-Annual-pension	CFO annual DB pension to CFO total wealth, %	companies' annual reports/ BoardEx
CFO-Total-pension	CFO total DB pension to CFO total wealth, %	companies' annual reports/ BoardEx
CFO-aboveCAP-member	indicator variable that takes the value of 1 if CFO pension exceeds the compensation cap and 0 otherwise	companies' annual reports
ln (CFO-Role-tenure)	log number of years of CFO in the company as CFO	BoardEx
ln (CFO-Board-tenure)	log number of years of CFO on the board	BoardEx
ln (CFO-Company-tenure)	log number of years of CFO in the company	BoardEx
ln (CFO-Age)	log CFO age	BoardEx
Company characteristics		
Ln (Company-size)	log of the company's total assets	DataStream
Leverage	total liabilities to market capitalisation plus total liabilities, %	DataStream
ROA	company's annual earnings to total assets, %	DataStream
Dividends	dividends to market capitalisation, %	DataStream
Cash	company's cash and cash equivalents to total assets, %	DataStream
Pension scheme characteristics		
Single-scheme	indicator variable that takes the value of 1 if company has only one DB scheme and 0 otherwise	companies' annual reports
Closure-to-FA	number of years since the scheme closure to future accruals	companies' annual reports
Maturity	pension liabilities paid out to total pension liabilities, %	DataStream/companies' annual reports
%Equity	share of pension assets invested in equities, %	DataStream/companies' annual reports

Table 4.2 reports a pair-wise correlation. Most variables have correlation coefficients below 0.40. However, there are several variables which tend to substantially correlate. For example, a high correlation is observed between CEO *Annual-pension* and CEO *Total-pension* with a correlation coefficient of above 0.94. Such a high correlation is expected as these variables all measure the CEO inside-debt incentives. The high correlation is also observed between CFO *Annual-pension* and CFO *Total-pension* with a correlation coefficient of above 0.91. Given that these highly correlated variables are used in the regressions alternatively, the strong association between these variables is not an issue. As expected, a high correlation is also observed between *Role-tenure*, *Company-tenure* and *Board-tenure* variables. These variables also to be used in the regressions alternatively.

Moreover, for each model specification the variance inflation factor (VIF) has been calculated. Overall, the results from the VIF estimates indicate that the degree of the variance of the estimated coefficients is not affected by the collinearity.

The pair-wise correlation shows that *%FR* is significantly and negatively correlated with *Total-pension*. The negative relationship means that DB schemes are less funded when the CEO has inside debt in the company, which contradicts with the stated hypothesis. However, it is important to distinguish whether or not CEO accrued pension above the compensation cap because CEO risk to pension losses raises after the pension exceeds the compensation threshold set by the PPF. As previously discussed, it is also important to account whether or not the company has only one DB scheme because the *%FR* may be less sensitive to CEO inside debt in multiple schemes. These factors are accounted at the empirical stage of the analysis. The pair-wise correlation, however, fails to find any correlation between CFO DB pension and *%FR*.

Table 4.2

Pair-wise correlation. Correlations significant at the 5% level or better are denoted with *. Correlations exceeding 0.4 threshold are highlighted in bold.

		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	%FR	1										
2	CEO-Annual-pension	-0.0237	1									
3	CEO-Total-pension	-0.1262*	**0.9455***	1								
4	ln (CEO-Role-tenure)	0.0098	0.042	0.0640*	1							
5	ln (CEO-Company-tenure)	-0.0474*	0.0491*	0.2861*	**0.6360***	1						
6	ln (CEO-Board-tenure)	-0.0533*	0.0435	0.1733*	**0.7925***	**0.8695***	1					
7	ln (CEO-Age)	-0.0107	0.0022	0.0763*	0.3394*	0.2384*	0.3127*	1				
8	Accounting-background	0.0053	-0.0159	-0.0515*	-0.0365	0.0074	0.0652*	-0.0283	1			
9	CFO-Annual-pension	0.0331	0.9140*	0.3341*	0.0470*	0.0526*	0.0476*	0.0022	-0.0169	1		
10	CFO-Total-pension	-0.0419	0.2895*	0.3255*	-0.0249	0.0517*	0.0055	-0.0444*	-0.0590*	**0.9179***	1	
11	ln (CFO-Role-tenure)	-0.0011	0.0645*	0.0224	0.2951*	0.2953*	0.3014*	0.1005*	-0.0746*	0.0707*	0.1734*	1
12	ln (CFO-Company-tenure)	-0.0084	0.0446	0.0671*	0.2798*	0.3396*	0.3192*	0.0666*	-0.0043	0.0532*	0.3484*	**0.8130***
13	ln (CFO-Board-tenure)	-0.0135	0.0618*	0.0352	0.2887*	0.3033*	0.3080*	0.1081*	-0.0785*	0.0685*	0.2016*	**0.9726***
14	ln (CFO-Age)	0.012	0.0587*	-0.0507*	0.0876*	0.0627*	0.0611*	0.2269*	-0.1422*	0.0634*	0.1489*	**0.4525***
15	Single-scheme	0.1925*	-0.0234	-0.1041*	0.0530*	0.0641*	0.0697*	-0.0839*	-0.0358	-0.0238	-0.0274	-0.0184
16	%Equity	-0.3524*	-0.0188	0.1811*	-0.0053	0.0726*	0.0714*	-0.0973*	-0.0856*	-0.0142	0.0889*	0.0480*
17	Closure-to-FA	0.1220*	-0.0151	-0.1473*	0.0874*	0.0354	0.0586*	0.0264	0.0083	-0.0187	-0.1521*	0.0852*
18	Maturity	0.0485*	-0.0516*	-0.0531*	-0.0098	-0.0793*	-0.0408	0.0594*	0.0758*	-0.0176	0.0042	-0.0228
19	ln (Company-size)	0.0819*	0.0407	-0.0551*	-0.0853*	-0.0790*	-0.0826*	0.0937*	0.043	0.0451*	-0.0484*	-0.0335
21	Leverage	-0.0533*	-0.0478*	0.1015*	-0.1311*	-0.1161*	-0.0932*	-0.0136	0.0941*	-0.0489*	0.0474*	-0.1927*
22	ROA	-0.0276	0.0071	-0.0174	0.1248*	0.1490*	0.1147*	-0.0255	-0.0595*	0.0073	0.0017	0.1407*
23	Dividends-to-MC	-0.0106	-0.0084	0.0063	0.0481*	0.0597*	0.0538*	0.0064	-0.0303	-0.0079	-0.0051	-0.0495*
24	Cash-to-TA	0.0009	-0.0021	-0.0028	0.0354	0.0951*	0.0667*	0.0184	-0.0490*	-0.0005	0.021	-0.031

		12	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**21**	**22**	**23**	**24**
12	ln (CFO-Company-tenure)	1											
13	ln (CFO-Board-tenure)	**0.8325***	1										
14	ln (CFO-Age)	0.3417*	**0.4821***	1									
15	Single-scheme	0.0228	-0.003	-0.1426*	1								
16	%Equity	0.0450*	0.0599*	-0.1973*	0.0268	1							
17	Closure-to-FA	0.0254	0.0736*	0.0842*	0.2161*	-0.1579*	1						
18	Maturity	-0.0134	-0.0158	0.1215*	-0.0755*	-0.2705*	0.0127	1					
19	ln (Company-size)	0.0048	-0.0486*	0.1650*	-0.2102*	-0.2325*	-0.1632*	0.1575*	1				
21	Leverage	-0.1736*	-0.1862*	-0.0417	-0.1552*	-0.0345	-0.1203*	0.1191*	0.3097*	1			
22	ROA	0.1509*	0.1339*	0.0145	0.0919*	0.1262*	0.0438*	-0.0780*	-0.2115*	**-0.5788***	1		
23	Dividends-to-MC	-0.0639*	-0.0518*	-0.0345	-0.0578*	-0.0409	-0.0355	-0.0083	-0.0059	0.2273*	-0.0657*	1	
24	Cash-to-TA	-0.025	-0.0403	-0.031	-0.0649*	-0.01	-0.0259	-0.0369	-0.0596*	0.1411*	-0.0013	**0.7929***	1

4.4. Results

4.4.1. Descriptive statistics

Table 4.3 reports descriptive statistics such as minimum (*Min*), mean (*Mean*), median (*Median*) and maximum (*Max*) values and standard deviation (*SD*) of the variables used in the study. For CEO and CFO pensions, the statistics are reported for the sample of all CEOs/CFOs and the sample of CEOs/CFOs with DB pensions only. The sample excludes Royal Mail Group as the company transferred the pension liabilities of around £40 billion to the new public sector (House of Commons report from 2013: Royal Mail Pension Plan). This event had a significant impact on the scheme funding level: the scheme turned to be in surplus after the transfer from having a deficit of around £10 billion before the transfer.

According to the statistics, the mean of *%FR* is 87.19% and the median is 87.85%. The minimum and maximum of *%FR* is 14.3% and 136.66% respectively, with a SD of 13.82%. These statistics show that the average pension scheme is underfunded by around 13% and that funding levels of DB schemes vary across companies. With regards to CEO annual DB pensions (here the main focus on CEOs-DB members only), pensions on average constitute around 3.64% of the total CEO wealth with a median of 2.22% and minimum and maximum values of less than 0.1% and 35.7% respectively. In pound value, the average (median) size of annual pension valued at £177.75 (£110.21) thousands with a minimum of less than a thousand and a maximum of nearly one million pounds. The significance of pensions relative to the CEO wealth is higher when DB pensions represent the total size of DB accruals. For example, the total size of DB pension on average constitute around 62.12% of the total CEO wealth, with a median of 34.08% and a maximum of 699.03%. In pound value, the average (median) size of total pension estimated at more than £3085.02 (£1774.50) thousand with a minimum of less than £6 thousand and maximum of over £22242 million. These numbers indicate that DB pension can be substantially large and may represent a significant portion of CEO total wealth.

The statistics reported on CFO DB pensions also highlights that DB are also widespread in CFO compensation. For example, CFOs pensions on average constitute around 4.24% of the total CFO wealth with a median of 2.30% and minimum and maximum values of less than 0.1% and 42.86% respectively. In pound value, the average (median) size of CFO annual pension valued at £86.85 (£50.99) thousands with a minimum of a thousand and a maximum of £540.66 thousand. The total size of DB pension on average constitute around 61.61% of the total CFO wealth, with a median of 32.34% and a maximum of 600.80%. In pound value, the average (median) size of CFO total pension estimated at more than £1407.31 (£669.50) thousand with a minimum of £5 thousand and maximum of over £13222 thousand. These numbers indicate that in pound value CFOs DB pensions are about two times lower than CEOs DB pensions, but there is no significant difference in the importance of CEOs and CFOs DB pensions relative to the total wealth. Therefore, despite that CFOs pension compensation is smaller than those of CEOs, DB pensions appear to be equally important for both CEOs and CFOs suggesting that CFOs incentives may also play an influential role in the funding of DB schemes.

For CEO-level characteristics-the average *Role-tenure* is 5.72 years (log of 1.63 years) and average *Company-* and *Board- tenure* is 11.57 and 8.49 years (or log of 2.22 and 1.99 years) respectively. Average *Age* of CEO is 52.4 years (log of 3.97 years). For CFO-level characteristics-the average *Role-tenure* is 5.28 years (log of 1.58 years) and average *Company-* and *Board- tenure* is 7.74 and 5.57 years (or log of 1.85 and 1.61 years) respectively. Average *Age* of CFO is 48.83 years (log of 3.90 years). Comparing CFO statistics with statistics on CEOs, it emerges that CEOs present longer on the board and in the company compared to CFOs. As the long-tenured executives are also more likely to delegate fewer financial decisions to others (Graham, Harvey and Puri, 2015), these statistics suggest that CEOs incentives might be more influential. Moreover, as CEOs are on average about 4 years older than CFOs, the incentives of CFOs could differ from those of CEOs as CEOs are closer to retirement.

With respect to company-specific variables, the average company has £41549.03 million in total assets (log-value of £7.71 million), *Leverage* of 41.46% with a median of 40.24%, *ROA* of 8.57% with a median of 7.72%, *Dividends* of 4.41% with a median of 2.83% and *Cash* of 10.52% with a median of 6.26%. To minimise the influence of outliers in the company-specific variables, variables such as *Leverage, ROA, Cash* and *Dividends* are winsorized at 2% and 98% levels.

The statistics on pension-scheme characteristics reveal that on average pension scheme has 48.58% of pension assets invested in equities with a median of 49% and minimum and maximum of none and 100% respectively. The length of *Closure-to-FA* is less than a year that suggests that DB schemes actively accrued pensions for existing and new members during the observation period and companies only recently started to close their schemes. The average (median) maturity ratio of DB scheme is 3.75% (3.56%) with a maximum ratio of 36.97% that suggests that DB schemes have fewer immediate liabilities as the company has more active or deferred members than pensioners.

For indicator variables, *CEO-DB member* and *CEO-aboveCAP-member (DB members only)* with the value of 1 constitute around 46% and 86% of the sample respectively. These numbers suggest that nearly half (46%) of all CEOs participated in DB pension schemes and that the majority of these CEOs had pensions in values accrued over the compensation threshold. *CFO-DB member* and *CFO-aboveCAP-member (DB members only)* with the value of 1 constitute around 44% and 77% of the sample respectively. These numbers suggest that 44% of all CFOs participated in DB pension schemes and that 77% of these CFOs had accrued pensions over the compensation threshold. The statistics also suggest that only 17% of CEOs had accounting-background and there are 27% of companies with only one DB pension scheme.

Table 4.4 further reports the breakdown of different types of pension arrangements in the CEO's (Panel A) and CFO's (Panel B) compensation package for the 2004 – 2015 period. As shown in Panel A of Table 4.4, in 2004 over 67 per cent of CEOs in the FTSE 350 companies were members of DB schemes. This is made of 52.3 per cent of CEOs who were served under DB pension plan only and more than 15 per cent of CEOs who were members of DC pension arrangement and/or had received cash in lieu of pension in addition to accrued benefits under DB arrangement. In 2004, nearly 22 per cent of CEOs were merely served under DC plan and only 6.5 per cent had received cash in alternative to pension contributions. As shown in Panel B of Table 4.4, the number of CFOs with DB arrangement is estimated to be higher and reached nearly 75 per cent in 2004. This comprises of more than 51.9 per cent of CFOs with DB only pension arrangement and more than 22 per cent of CFOs with both DB and DC arrangements, and DB and cash supplements. In 2004 less than 18 per cent of CFOs were members of DC plan and only 4 per cent of CFOs had received cash in lieu of pension contributions only. This trend has, however, changed significantly and has been matched by a steady increase in the number of executives with DC and cash in lieu of pension arrangements, and corresponding decrease in the number of executives with DB membership. For example, in 2015 number of CEOs with cash in lieu of pension had rapidly increased to 44.5 per cent from just less than 10 per cent in 2004. The increase in the number of CEOs with DC pension has been more modest and reached nearly 29 per cent in 2015 from 21 per cent in 2004. The popularity of the final salary pension arrangement has steadily declined and in 2015 less than 7 per cent of CEOs accrued pension merely under DB scheme. In aggregate, the proportion of CEOs with DB pension is estimated at less than 25 per cent in 2015 compared to more than 67 per cent in 2004. The decrease of DB pension among CFOs has been more rapid and dropped to 17 per cent in 2015 from 75 per cent in 2004. Less than 7 per cent of CFOs accrued pension under DB scheme only. In 2015, 43 per cent of CFOs had received cash in lieu of pension contributions, 28 per cent were served under DC plan and 8.3 per cent of CFOs had received cash while being member of DC plan.

Table 4.3
Descriptive statistics

	Min	Mean	Median	Max	SD	N of observations
%FR (%)	14.34	87.19	87.85	136.66	13.82	1960
CEO inside debt						
CEO-Annual-pension to wealth, %	0.00	1.76	0.00	35.70	3.49	1712
CEO-Annual-pension, £	0.00	81.78	0.00	978.00	153.74	1830
DB members only - Annual-pension to wealth, %	0.00	3.64	2.22	35.70	4.28	827
DB members only - Annual-pension, £ thousands	0.76	177.75	110.21	978.00	185.27	842
CEO-Total-pension to wealth, %	0.00	26.04	0.00	699.03	59.09	1701
CEO-Total-pension, £ thousands	0.00	1304.64	0.00	22242.00	2797.94	1712
DB members only - Total-pension to wealth, %	0.05	62.12	34.08	699.03	78.05	713
DB members only - Total-pension, £ thousands	6.52	3085.02	1774.50	22242.00	3609.18	724
CFO inside debt						
CFO-Annual-pension to wealth, %	0.00	1.84	0.00	42.86	4.10	1805
CFO-Annual-pension, £	0.00	37.97	0.00	540.66	73.29	1816
DB members only - Annual-pension to wealth, %	0.04	4.24	2.30	42.86	5.35	783
DB members only - Annual-pension, £ thousands	1.00	86.85	50.99	540.66	89.69	794
CFO-Total-pension to wealth, %	0.00	25.44	0.00	600.80	61.93	1741
CFO-Total-pension, £ thousands	0.00	586.38	0.00	13222.00	1357.91	1752
DB members only - Total-pension to wealth, %	0.28	61.61	32.34	600.80	84.04	719
DB members only - Total-pension, £ thousands	5.00	1407.31	669.50	13222.00	1808.89	730
Other CEO characteristics						
ln (CEO-Role-tenure)	0.00	1.63	1.65	3.70	0.74	1861
CEO-Role-tenure	0.00	5.72	4.20	39.40	5.63	1861
ln (CEO-Company-tenure)	0.00	2.22	2.29	3.77	0.85	1861
CEO-Company-tenure	0.00	11.57	8.90	42.40	9.28	1861
ln (CEO-Board-tenure)	0.00	1.99	2.05	3.70	0.76	1854
CEO-Board-tenure	0.00	8.49	6.80	39.40	6.82	1854
ln (CEO-Age)	3.58	3.97	3.97	4.33	0.11	1844
CEO-Age	35.00	52.40	52.00	75.00	6.02	1844
Other CFO characteristics						
ln (CFO-Role-tenure)	0.00	1.58	1.60	3.58	0.73	1836
CFO-Role-tenure	0.00	5.28	3.95	34.70	4.84	1836
ln (CFO-Company-tenure)	0.00	1.85	1.87	3.64	0.83	1836
CFO-Company-tenure	0.00	7.74	5.50	37.10	7.08	1836
ln (CFO-Board-tenure)	0.00	1.61	1.65	3.58	0.74	1836
CFO-Board-tenure	0.00	5.57	4.20	34.70	5.08	1836
ln (CFO-Age)	3.53	3.90	3.91	4.20	0.11	1828
CFO-Age	33.00	48.83	49.00	66.00	5.62	1828

	Min	Mean	Median	Max	SD	N of observations
Company characteristics						
Ln (Company-size), £ mil	4.33	7.71	7.54	12.34	1.42	1758
Company-size, £ mil	37.15	41549.03	2047.00	2394570.00	195424.10	2033
Leverage, %	1.81	41.46	40.24	99.34	18.43	1729
ROA, %	-84.04	8.57	7.72	100.83	9.05	1732
Dividends, %	0.00	4.41	2.83	210.61	13.46	1722
Cash, %	0.00	10.52	6.26	632.05	31.74	1528
Pension scheme characteristics						
Equity, %	0.00	48.58	49.00	100.00	19.76	1854
Closure-to-FA, years	0.00	0.73	0.00	15.00	1.98	1920
Maturity, %	0.00	3.75	3.56	36.97	2.14	1841
Indicator variables						
CEO-DB members	0.00	0.46	0.00	1.00	0.50	1842
CEO-aboveCAP-member (DB-members only)	0.00	0.86	1.00	1.00	0.35	842
CFO-DB members	0.00	0.44	0.00	1.00	0.50	1818
CFO-aboveCAP-member (DB-members only)	0.00	0.77	1.00	1.00	0.42	794
Accounting-background	0.00	0.17	0.00	1.00	0.38	1865
Single-scheme	0.00	0.27	0.00	1.00	0.45	1894

Table 4.4

Types of pension provisions of CEOs and CFOs over the period between 2004 – 2015, %

Panel B: Types of pension provisions of CEOs over the period between 2004 – 2015, %

	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2004-2015**
DB only	81	76	59	58	49	44	43	29	25	14	15	12	**505**
	52.26	46.63	34.50	32.58	28.16	25.00	24.02	16.11	13.23	7.49	7.85	6.28	**23.66**
DB/DC	8	10	8	3	8	9	9	9	6	6	6	5	**87**
	5.16	6.13	4.68	1.69	4.60	5.11	5.03	5.00	3.17	3.21	3.14	2.62	**4.08**
DB/Cash	12	13	30	33	32	32	29	34	35	32	28	27	**337**
	7.74	7.98	17.54	18.54	18.39	18.18	16.20	18.89	18.52	17.11	14.66	14.14	**15.79**
DB/DC/Cash	4	4	0	1	0	1	2	1	3	4	2	1	**23**
	2.58	2.45	0.00	0.56	0.00	0.57	1.12	0.56	1.59	2.14	1.05	0.52	**1.08**
DC only	26	32	30	36	40	37	39	35	39	43	45	47	**449**
	16.77	19.63	17.54	20.22	22.99	21.02	21.79	19.44	20.63	22.99	23.56	24.61	**21.04**
DC/Cash	8	8	11	5	4	3	5	12	12	6	7	8	**89**
	5.16	4.91	6.43	2.81	2.30	1.70	2.79	6.67	6.35	3.21	3.66	4.19	**4.17**
Cash only	10	15	22	31	36	42	45	53	60	72	80	85	**551**
	6.45	9.20	12.87	17.42	20.69	23.86	25.14	29.44	31.75	38.50	41.88	44.50	**25.82**
None	6	5	11	11	5	8	7	7	9	10	8	6	**93**
	3.87	3.07	6.43	6.18	2.87	4.55	3.91	3.89	4.76	5.35	4.19	3.14	**4.36**
Total	**155**	**163**	**171**	**178**	**174**	**176**	**179**	**180**	**189**	**187**	**191**	**191**	**2134**

Panel B: Types of pension provisions of CFOs over the period between 2004 – 2015, %

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2004-2015
DB only	83	79	65	64	55	53	41	21	15	15	14	12	**517**
	51.88	48.47	37.79	35.56	31.61	29.28	22.28	11.48	7.94	7.77	7.14	6.22	**23.85**
DB/DC	15	12	9	7	6	5	7	6	6	4	2	3	**82**
	9.38	7.36	5.23	3.89	3.45	2.76	3.80	3.28	3.17	2.07	1.02	1.55	**3.78**
DB/Cash	22	23	32	28	25	21	21	28	36	27	20	18	**301**
	13.75	14.11	18.60	15.56	14.37	11.60	11.41	15.30	19.05	13.99	10.20	9.33	**13.88**
DB/DC/Cash	0	2	2	0	0	0	1	1	1	3	2	1	**13**
	0.00	1.23	1.16	0.00	0.00	0.00	0.54	0.55	0.53	1.55	1.02	0.52	**0.60**
DC only	26	31	32	39	44	55	62	59	50	55	53	54	**560**
	16.25	19.02	18.60	21.67	25.29	30.39	33.70	32.24	26.46	28.50	27.04	27.98	**25.83**
DC/Cash	3	2	7	5	3	4	7	13	20	16	23	16	**119**
	1.88	1.23	4.07	2.78	1.72	2.21	3.80	7.10	10.58	8.29	11.73	8.29	**5.49**
Cash only	6	10	18	31	36	39	40	52	54	66	76	83	**511**
	3.75	6.13	10.47	17.22	20.69	21.55	21.74	28.42	28.57	34.20	38.78	43.01	**23.57**
None	5	4	7	6	5	4	5	3	7	7	6	6	**65**
	3.13	2.45	4.07	3.33	2.87	2.21	2.72	1.64	3.70	3.63	3.06	3.11	**3.00**
Total	160	163	172	180	174	181	184	183	189	193	196	193	**2168**

The statistics presented above describes the variables used in this study. However, it is difficult to understand whether or not CEOs/CFOs DB pensions are associated with the funding of DB schemes. To better understand whether CEOs/CFOs DB pensions are associated with higher *%FR*, companies are sorted into three groups: companies with (1) *alternative-arrangements*, (2) *always-DB-pensions* and (3) companies-*Switchers. Alternative-arrangements* group includes companies whose CEOs/CFOs never had DB pensions during the 2004-2015 period and had alternative pension arrangements such as DC or cash pensions. *Always-DB-pensions* group includes companies whose CEOs/CFOs were always members of DB schemes, and the companies-*Switchers* group includes companies whose CEOs/CFOs participated in DB schemes, but new CEOs/CFOs were offered alternative pension arrangements. The latter group also includes CEOs/CFOs who decided to withdraw their pensions from the schemes leaving managers with no inside debt. Companies in always-*DB-pensions* and companies-*Switchers* are further re-sorted into two groups: companies with (1) *aboveCAP-pensions* and (2) *belowCAP-pensions*. *aboveCAP-pensions* group includes companies whose CEOs/CFOs DB pensions exceed the compensation threshold while *belowCAP-pensions* group includes companies whose CEOs/CFOs DB pensions are below the compensation cap[16].

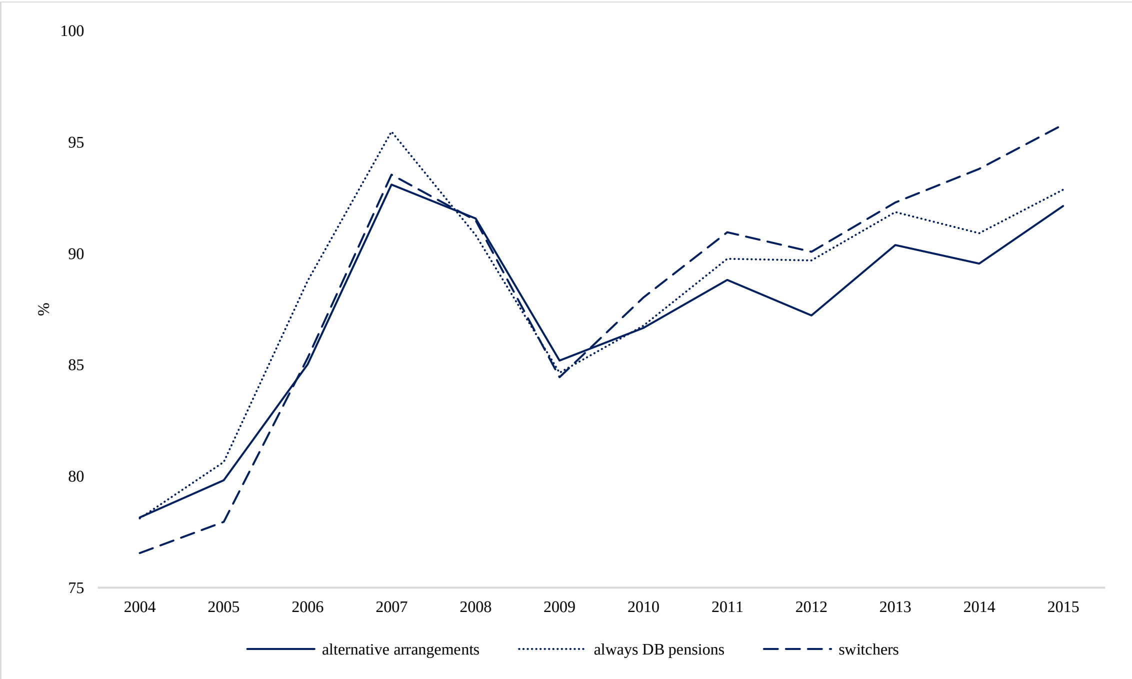
Graph 4.1 graphically displays *%FR* for companies with *alternative-arrangements, always-DB-pensions* and companies-*Switchers* which were created based on CEOs. Graph 4.2 further displays *%FR* for companies with *alternative-arrangements, aboveCAP-pensions* and *belowCAP-pensions* which were also created based on CEOs. Using the mean of *%FR*, Graph 4.1 reveals no significant differences in *%FR* between companies with *alternative-arrangements, always-DB-pensions* and companies-*Switchers*. However, Graph 4.2 depicts

[16] Both *aboveCAP-pension* and *belowCAP-pension* may also include CEOs with non-DB arrangements. *aboveCAP-pension* also includes companies whose CEOs DB pensions were below the compensation cap before exceeding the compensation cap.

that *%FR* of DB schemes is higher in companies whose CEOs accrued pension above the compensation cap than in companies whose CEOs accrued pension below cap and companies with alternative pension arrangements. These graphs illustrate that CEO DB pensions may be related to the %FR, but only when CEO DB pensions exceed the compensation threshold, as consistent with the hypothesis. This conjecture is further tested using regression analysis.

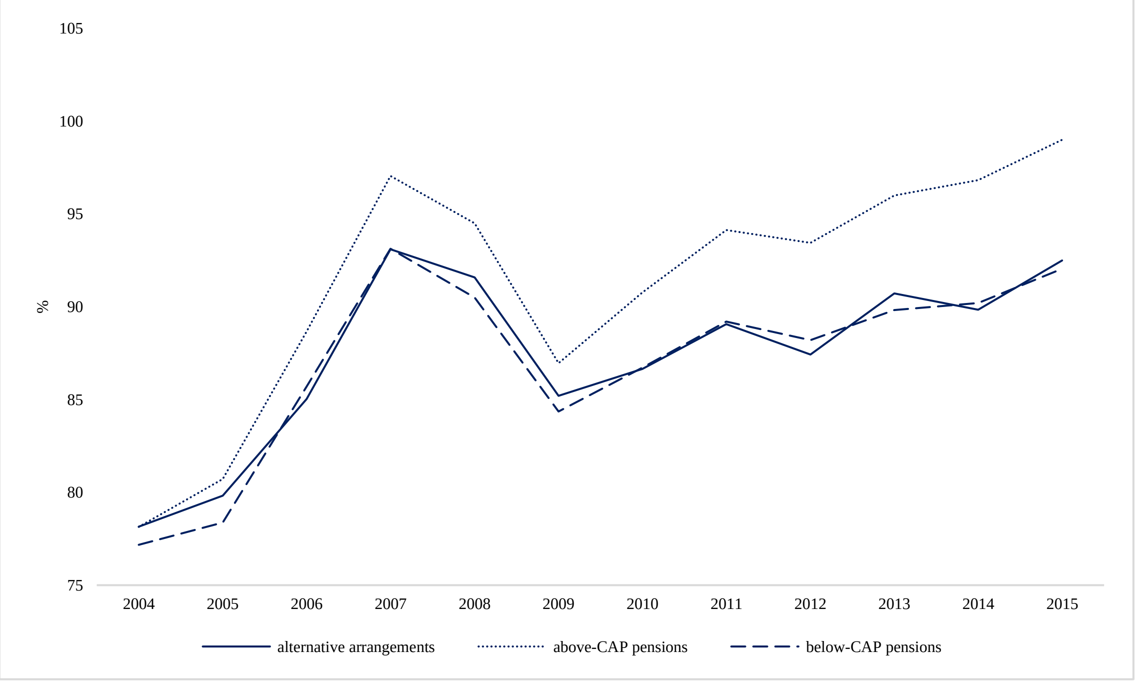
Graph 4.1

%FR of *alternative-arrangements*, *always-DB-pensions* and *switchers (CEO sample)*



Graph 4.2

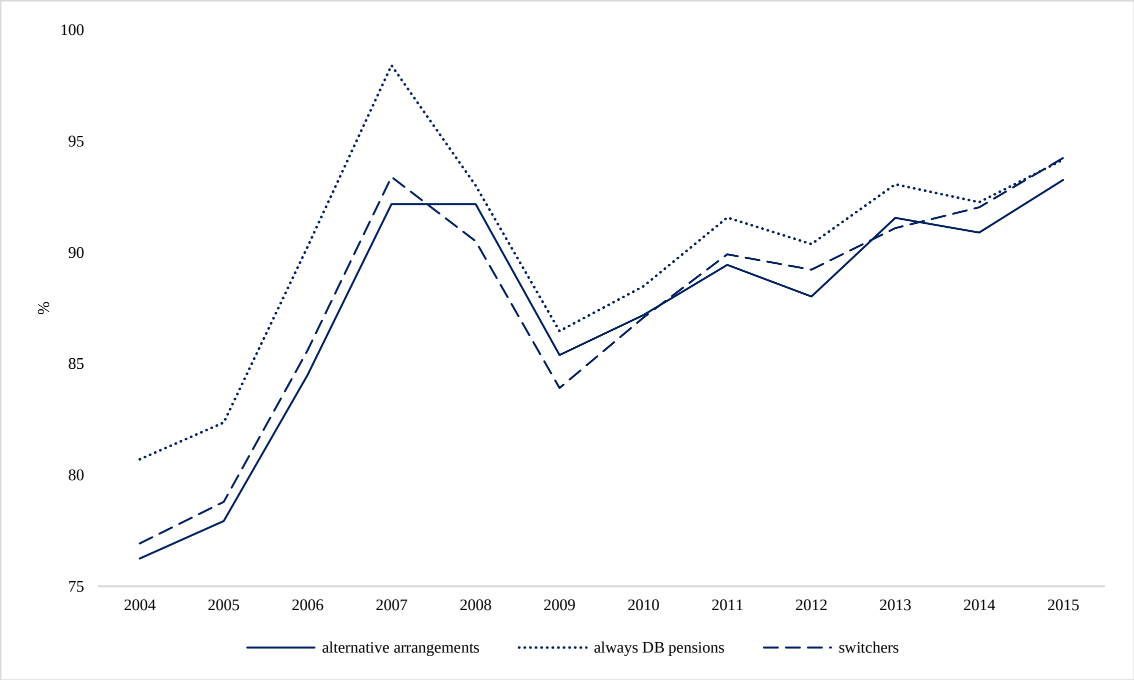
%FR of *alternative-arrangements, aboveCAP-pensions* and *belowCAP-pensions groups (CEO sample)*



Graph 4.3 graphically displays *%FR* for companies with *alternative-arrangements, always-DB-pensions* and companies-*Switchers* for CFOs. Graph 4.4 further displays *%FR* for companies with *alternative-arrangements*, *aboveCAP-pensions* and *belowCAP-pensions* for CFOs. Using the mean of *%FR*, both Graph 4.3 and 4.4 reveal no significant differences in *%FR* between companies with *alternative- arrangements*, *aboveCAP-pensions* and *belowCAP-pensions*. This suggests that CFOs inside-debt incentives could be less of importance than those of CEOs.

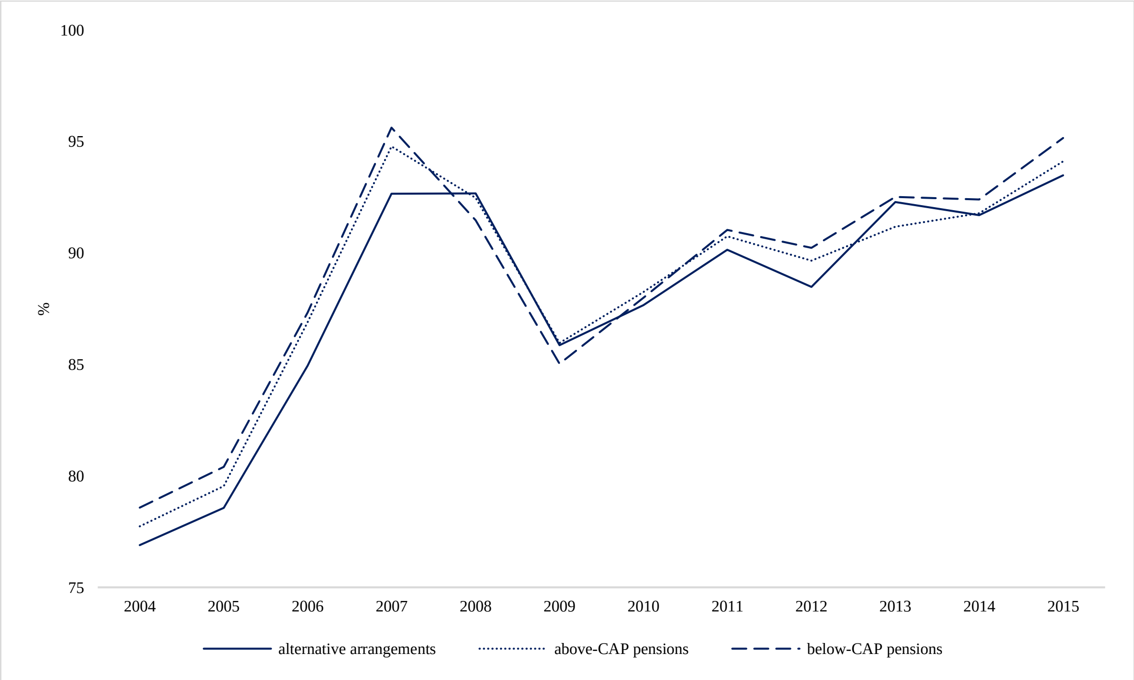
Graph 5.1

%FR of *alternative-arrangements, always-DB-pensions* and *switchers (CFO sample)*



Graph 5.2

%FR of *alternative-arrangements, aboveCAP-pensions* and *belowCAP-pensions groups (CFO sample*)



4.4.2. Empirical results

At the empirical stage of the analysis, this study considers employing Ordinary Least Square (OLS) estimation method. One potential estimation issue is the panel structure of the sample. When there is a combination of cross-section and time-series data, it is plausible to test whether there are cross-sectional heteroscedasticity and residual autocorrelation within a given cross-sectional unit. The results from the Breusch-Pagan / Cook-Weisberg tests for heteroskedasticity and autocorrelation reveal that the error terms are heteroscedastic. Heteroskedastic errors make OLS estimators inefficient and induce bias in the corresponding standard errors. A significant test statistic for the presence of autocorrelation also indicates about the presence of serial correlation in the error terms. Apart from autocorrelation, the correlation between the cross-sections of the panel is another form of correlation that might also be present in the data. There are procedures to test for cross-sectional dependence (Hoyos and Sarafidis, 2006, Pesaran, 2006). However, the test for cross-sectional dependence cannot be performed as the panel is unbalanced and there are too many cross-sections. Nevertheless, cross-sectional correlation is considered common for panels when there are much more cross-sections than time periods.

While the presence of heteroscedasticity and autocorrelation and cross-section correlation does not destroy the consistency of the OLS estimator, OLS is no longer efficient as the standard errors will be biased. To correct for the lack of efficiency, a Feasible Generalised Least Square (FGLS) estimation method is used that allows for the presence of autocorrelation within panels and cross-sectional correlation and heteroskedasticity across panels that will result in an efficient estimation.

Moreover, it is argued that FGLS is preferred when a time-variation in the data is lower than a cross-sectional variation – as in the case here. For example, Davies and de Haan, 2012 argue that Within-estimation does not produce a good fit when the time variation in the data is much lower than the cross-sectional variation because within estimation loses too much information[17]. Therefore, FGLS estimation approach is appropriate for this study. The appropriateness of random effects was also verified by using the Hausman specification test.

As a robustness check, this study also used simple linear regression Ordinary Least Squares (OLS) estimation method with industry and year effects. To deal with the heteroskedasticity problem in OLS, standard errors are clustered at the company-level. The results from OLS are consistent with the estimates obtained from FGLS (the results from OLS are not tabulated).

DB pensions and the funding of DB schemes

Results from FGLS regressions are reported in Tables 4.5 - 4.8: Table 4.5 reports results from regressions controlling for *Role-tenure*, Tables 4.6, 4.7 and 4.8 report results from regressions controlling for *Company-tenure, Board-tenure* and CEO *Age* respectively. Results reported in Tables 4.6, 4.7 and 4.8 yield estimates which are consistent with those reported in Table 4.5 and thus are shown in Appendix for the sake of saving space. Each regression includes (unreported) year and industry dummies to control for any unobserved time- and industry- related effects. To check for multicollinearity among independent variables, VIF has been calculated for each model specification. Estimates from VIF suggest that multicollinearity is not an issue as the VIF does not exceed the critical value of 10 (Belsley, Kuh, and Welsch, 1980).

Results from the regression analyses using FGLS estimation and controlling for *Role-tenure* are reported in Table 4.5. The *%FR* is first regressed on the CEO *Annual-pension* X *aboveCAP-member* and other independent variables (Model (1)). Then the *%FR* is regressed on the CFO *Annual-pension* X *aboveCAP-member* and other independent variables (Model (2)). Results reported in Model (3) includes both *CEO-* and *CFO- Annual-pension* to ensure that results

[17] Davies and de Haan (2013) also uses FGLS to explain the contribution policy of DB schemes. They explain that FGLS is more preferable when time-variation in the data is lower than the cross-sectional variation. The sample includes 240 pension funds over the 1996-2005 period.

remain robust to inclusion of other control variables. In a similar sequence, regressions are re-run using CEO *Total-pension* and CFO *Total-pension* along with other variables with estimates shown in Model s (4) – (6) of Table 4.5.

Hypothesis 1 predicts that *%FR* positively associate with CEO DB pension. The results from the FGLS estimators provide strong support in favour of this hypothesis. In Model (1) of Table 4.5, the coefficient for two-way interactions *CEO-Annual-pension*CEO-aboveCAP* (CEOs who accrued pensions above the compensation cap) is positive and statistically significant (*βCEO-Annual-pension*CEO-aboveCAP* = 1.119, $p < 0.001$). The positive relationship suggests that DB schemes in companies whose CEOs accrued pensions above the compensation cap are observed to be better-funded compared to DB schemes in companies whose CEOs have alternative pension arrangements. It is estimated that a 1% increase in *CEO-Annual-pension* above the compensation cap is associated with 1.119 percent increase in *%FR*. The coefficient for *CEO-Annual-pension*CEO-aboveCAP* remains positive and highly statistically significant when controlling for *CFO-Annual-pension* (Model (3)): it is estimated that a 1% increase in *CEO-Annual-pension* above the compensation cap (when controlling for CFO Annual-pension) is associated with 1.430 percent increase in *%FR*.

However, estimates for two-way interaction CFO *Annual-pension*aboveCAP-member* reported in Model (2) fails to find any evidence in support of the hypothesis 2 that predicts that CFOs DB pensions are also associated with higher funding levels. The coefficient is statistically insignificant (*βCFO-Annual-pension*CFO-aboveCAP* = -0.227, $p < 0.235$) and remains so when controlling for *CEO-Annual-pension* (Model (3)). In contrast to the prediction, this finding suggests that CFO inside-debt incentives generated by DB pensions do not associate with the higher funding levels. While CFO *Annual-pension*aboveCAP-member* shows no association with the funding level of pension schemes, CEO *Annual-pension*aboveCAP-member* is found to be positively associated with the funding levels of DB schemes. This highlights the importance and dominance of CEOs inside-debt incentives and insignificance of CFOs inside-debt incentives for the funding levels of DB schemes.

Estimates for two-way interactions reported in Models (4) and (6) further provide evidence in favour of hypothesis 1. The coefficient remains consistent (in terms of sign and significance) when *CEO-aboveCAP-member* interacts with *CEO-Total-pension.* It is estimated that a 1% increase in *CEO-Total-pension* above the compensation cap is associated with 0.061 percent increase in *%FR* (Model 4). The coefficient also remains statistically significant at 1% confidence level when controlling for *CFO-Total-pension:* it is estimated that a 1% increase in *CEO-Total-pension* above the compensation cap is associated with 0.093% percent increase in *%FR* (Model 6). With respect to CFOs, two-way interaction *CFO-Total-pension*CFO-aboveCAP* is not statistically significant, as shown in Models (4) and (6).

Overall, the obtained results highlight the importance of CEOs inside-debt incentives for the funding levels of DB schemes, as consistent with hypothesis 1. Consistent with the agency theory, inside debt incentives generated by DB pensions make CEOs to be cautious about the funding of DB schemes and possibly take actions to reduce the riskiness of schemes, which can help to preserve their pension entitlements. However, analysis fails to find any evidence of the association between CFO-inside debt incentives and the funding levels of DB schemes. Taken together, these findings suggest that CEO incentives play a more influential role than CFO incentives.

When regressing *%FR* on CEO DB pensions (*Annual-* or *Total- pension)* without distinguishing between CEOs with DB pensions below/above the compensation cap, the estimated coefficients are negative but not statistically significant (results are not tabulated). This suggests that incentives also differ among CEOs with DB pensions. When the value of accrued DB pension exceeds the compensation threshold, CEO become more sensitive to the pension funding because he becomes to be more concerned about the security of his pension entitlement. In contrast, CEOs with pensions below the compensation cap appear to be less incentivised to keep healthy scheme due to lower personal losses compared to CEOs with pensions above the compensation cap. These findings raise the confidence that it is necessary to take the riskiness of inside debt and distinguish between those who might/might not face a material loss of personal wealth as CEOs with DB pensions appear to have conflicting interests. The negative coefficient on CEO AboveCAP member may suggest about the prevalence of the inheritance effects. In particular, the higher funding levels in firms with non-DB CEOs may incorporate effects of CEOs with DB pension arrangements. For example, CEOs with alternative pension arrangements who succeeded CEOs with DB pension arrangements may inherent DB schemes with already higher funding levels due to previous CEOs actions put in place. This perhaps explains the negative sign of the estimated coefficient.

As the funding can be less sensitive to CEO and CFO inside-debt incentives in companies with multiple schemes, the %*FR* is then regressed on the three-way interaction *CEO-Annual-pension*CEO-aboveCAP-member*Single-scheme* (Model (7)). Model (8) reports results from regressions including three-way interaction between *CFO-Annual-pension, CFO-aboveCAP-member and Single-scheme.* Model (9) reports results from regressions including three-way interaction between *CEO-Annual-pension*CEO-aboveCAP-member*Single-scheme* and three-way interaction between *CFO-Annual-pension, CFO-aboveCAP-member and Single-scheme.* In a similar sequence, regressions are also re-run using CEO *Total-pension* and CFO *Total-pension* along with other variables with estimates shown in Models (10) – (12) of Table 4.5.

Models (7) - (12) of Table 4.5 presents estimates from the FGLS for three-way interaction variable *Annual-pension*aboveCAP-member*Single-scheme.* Estimates for three-way interaction provide additional evidence in support of hypothesis 1. The coefficient for the three-way interaction term *CEO-Annual-pension*aboveCAP-member*Single-scheme* is positive and significant at the conventional levels. This finding indicates that funding of DB schemes is higher in companies with single-schemes and whose CEOs accrued DB pensions above the compensation cap. While CEOs with DB pensions above the cap are associated with higher funding suggesting that CEOs interests are aligned with those of other scheme members, it appears that CEOs care more about the scheme in which they participate. It has been estimated that for CEOs with accrued pension above the compensation threshold and where there is only one DB scheme, a 1% increase in *CEO-Annual-pension* is associated with 3.098% increase in the *%FR* (Model (7)). The coefficient is statistically significant at the 5% confidence level. The three-way interaction coefficient also remains positive and statistically significant at the 10% confidence level when controlling for CFO-Total-pension: a 1% increase in *CEO-Annual-pension* is associated with 2.238% increase in the *%FR* (Model (9)).

With respect to CFOs, the results also remain insignificant when CFO *Annual-pension*aboveCAP-member* further interacts with *Single-scheme*. The coefficients are statistically insignificant, as shown in Models (8) and (9). The insignificant relationship between CFO DB pension and the *%FR* re-confirms the previous findings of the unimportance of CFO inside debt incentives for the funding of DB schemes.

Re-estimation of regressions with *Total-pension* yield consistent results (in terms of sign and significance). For CEOs with accrued pension above the compensation threshold and where there is only one DB scheme, a 1% increase in CEO *Total-pension* is associated with 0.583% increase in the *%FR* (Model (10)). The results remain robust to the inclusion of three-way interaction *CFO-Annual-pension~*aboveCAP-member*Single-scheme.* It is estimated that for CEOs with accrued pension above the compensation threshold and where there is only one DB scheme, a 1% increase in CEO *Total-pension* is associated with 0.549% increase in the *%FR* (Model (12)). Both coefficients *CEO-Total-pension*aboveCAP-member*Single-scheme* are statistically significant at the 1% confidence levels. The coefficients for CFO DB pension remain insignificant in all model specifications. Including CFO two- or three- way interactions do not affect the results obtained for CEOs.

Estimates from regressions reported in Tables 4.6, 4.7 and 4.8 controlling for CEO *Company-*, *Board- tenure* and *Age* respectively are similar in direction and significance to those discussed above. In aggregate, results provide plausible evidence in favour of the stated hypothesis regarding CEO but not with respect to CFO.

With respect to other executive-specific characteristics, it has been found that *CEO-Role-tenure* is positively associated with the *%FR*: the estimated coefficients are statistically significant at the conventional levels in almost all model specifications except for the results shown in Model (6). The positive relationship suggests that DB pension schemes are better funded in companies with long-tenured CEOs. It is estimated that additional year of service is associated with 0.473%-0.576% (log) increase in *%FR*. There is some evidence that *CEO-Age* might also be important for the funding levels of DB pension schemes. The estimated coefficients are positive and statistically significant. The possible explanation for this is that as tenure gets longer, CEO also becomes older that causes CEO to care about pensions leading to higher funding levels in DB schemes. Other variables such *CEO-Board- and Company- tenure* and *Accounting-background* are not statistically significant. With respect to CFO-specific characteristics, it is found that *CFO-Age* negatively associates with the *%FR*. This implies that older CFOs have a short-term orientation leading to lower funding levels in DB schemes, in contrast to CEOs. Other CFO-specific variables are not significant.

With respect to company- and pension scheme- specific characteristics, there are number of variables that are found to be associated with funding levels of DB schemes. For example, consistent with prediction, there is evidence that *Single-scheme* is better funded. Depending on the model specification, it has been estimated that companies with *Single-scheme*s are 3.766%-4.999% better funded than companies with multiple schemes, which is economically significant. All coefficients S*ingle-scheme* are statistically significant at the 1% confidence levels.

There is evidence that *Leverage* negatively associates with *%FR* suggesting that pension schemes have lower funding levels in financially constrained companies. This finding is consistent with the prediction that companies tend to reduce pension contributions when they are likely, due to the already high presence of debt, to face borrowing constrains the capital markets leading to a higher deficit. It is estimated that a 1% increase in *Leverage* is associated with 0.035%-0.051% decrease in the *%FR*. The estimated coefficients are statistically significant at least at the 5% confidence levels across all model specifications except for the Model in Model (12).

Also, there is evidence that *Dividends* positively associate with *%FR* suggesting that DB schemes are better funded in companies which pay higher dividends. This finding, however, implies that shareholders in a company with a pension deficit should anticipate that future dividends are likely to be reduced, which may also have implications for future stock prices of companies with underfunded DB schemes. The estimated coefficients are statistically significant at least at the 5% confidence levels with a magnitude ranging between 0.122%-and 0.189% depending on the model specifications. It is also found that *Cash* positively associates with higher *%FR*. The estimated coefficients are statistically significant at least at the 5% confidence levels with a magnitude ranging between 0.070%-and 0.101% depending on the model specifications.

Closure-to-FA negatively associates with the *%FR* highlighting that DB schemes are worse off after the closure. This is consistent with the argument that the lack of additional sources of financing and the inability to share the cost of pensions with employees can encourage companies to take more pension risk. While it is predicted that *Maturity* negatively associates with *%FR*, the estimates suggest that *Maturity* positively associates with the *%FR*. The positive relationship implies that more mature schemes are better funded, which contradicts with the finding of Davies and de Haan (2012) who argue that more mature scheme tends to make lower pension contributions. The size of pension contributions more likely to be determined by the pension deficit. Given that majority of pension schemes in the UK are underfunded, this possibly explains why *Maturity* positively associates with the *%FR* as companies are expected to make higher contributions in order to meet all pension liabilities.

Another variable that is found to be important is *%Equity*. The negative relationship between *%Equity* and *%FR* implies that companies invest a higher share of pension assets in equities that leads to a higher deficit. As discussed previously, investing a larger portion of assets into equities companies set higher expected rates of return allowing them to make lower pension contributions. As a result, lower pension contributions are insufficient to cover the full cost of pensions that leads to a higher deficit and an increase in the overall risk of the pension scheme. It has been estimated that a 1% increase in *%Equity* associate with 0.103%-0.117% decrease in *%FR*. Other variables appear to be less important.

Estimates from regressions reported in Tables 4.6, 4.7 and 4.8 (these results are shown in Appendix) controlling for CEO *Company-tenure, Board-tenure* and *Age* respectively are similar in direction and significance to those discussed above.

Table 4.5
FGLS results for funding of DB schemes (*%FR*)

This tables reports results from FGLS regressions on whether CEO DB pension holdings are related to the dependent variable, Funding Ratio, which is defined as the ratio of pension assets to the value of pension liabilities. Panel A reports results from regressions including a two-way interaction term and Panel B reports results from regressions including a three-way interaction term. Models 1 to 3 include a two-way interaction Annual-pension*aboveCAP-member and Models 4 to 6 include a two-way interaction Total-pension*aboveCAP-member. Models 7 to 9 include a three-way interaction Annual-pension*aboveCAP-member*Single-scheme and Models 10 to 12 include a three-way interaction Total-pension*aboveCAP-member*Single-scheme. Regressions reported in this table control for Role-tenure. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A:

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Annual-pension			Total-pension		
CEO-DB-pension	-1.031***		-1.316***	-0.057**		-0.092***
	(0.002)		(0.000)	(0.031)		(0.000)
CEO-aboveCAP-member	-3.798***		-4.363***	-3.289***		-3.836***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension *CEO-aboveCAP-member	1.119***		1.430***	0.061**		0.093***
	(0.001)		(0.000)	(0.022)		(0.000)
Single-scheme	4.289***	4.345***	3.766***	4.384***	4.999***	3.839***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.0000)	(0.000)
ln (CEO-Role-tenure)	0.552**		0.547**	0.538**		0.412
	(0.024)		(0.028)	(0.028)		(0.103)
Accounting-background	-0.112		-0.081	0.405		0.227
	(0.869)		(0.912)	(0.513)		(0.741)
CFO-DB-pension		0.14	0.09		0.025	0.012
		(0.446)	(0.653)		(0.142)	(0.417)
CFO-aboveCAP-member		0.646	0.680		1.020	2.000
		(0.304)	(0.292)		(0.151)	(0.004)
CFO-DB-pension *CFO-aboveCAP-member		-0.227	-0.188		-0.033*	-0.021
		(0.235)	(0.362)		(0.063)	(0.158)
ln (CFO-Role-tenure)		-0.285	-0.212		-0.226	-0.423
		(0.304)	(0.453)		(0.431)	(0.152)
%Equity	-0.104***	-0.105***	-0.103***	-0.106***	-0.111***	-0.117***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.514***	-0.288*	-0.483***	-0.535***	-0.375**	-0.519***
	(0.002)	(0.058)	(0.002)	(0.001)	(0.016)	(0.000)
Maturity	0.598***	0.593***	0.556***	0.687***	0.624***	0.676***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.154	-0.253	0.135	-0.429	-0.353	-0.569*
	(0.604)	(0.427)	(0.651)	(0.132)	(0.283)	(0.052)
Leverage	-0.044**	-0.043**	-0.052***	-0.044**	-0.045**	-0.039**
	(0.014)	(0.017)	(0.003)	(0.013)	(0.020)	(0.032)
ROA	-0.025	-0.056*	-0.046	-0.038	-0.049	-0.058*
	(0.415)	(0.070)	(0.148)	(0.204)	(0.130)	(0.062)
Dividends	0.151**	0.149**	0.166***	0.122**	0.161**	0.159***
	(0.013)	(0.016)	(0.008)	(0.038)	(0.012)	(0.010)
Cash	0.075**	0.071**	0.082**	0.089***	0.070**	0.101***
	(0.022)	(0.024)	(0.013)	(0.007)	(0.035)	(0.002)
_cons	90.51***	97.40***	91.63***	97.00***	98.848***	99.831***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,090	1,156	1,048	1,065	1,098	1,005
Number of companies	128	130	126	128	130	127
Wald chi2	955.03	1045.7	977.11	1000.87	935.4	994.52
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.5. continued

Panel B

Dependent variable - %FR
Explanatory pension variable – Annual- or Total- pension

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Annual-pension			Total-pension		
CEO-DB-pension	-0.565*		-1.095***	-0.037		-0.083***
	(0.096)		(0.001)	(0.135)		(0.000)
CEO-aboveCAP-member	-4.037***		-4.240***	-3.313***		-3.578***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.653*		1.177***	0.041*		0.082***
	(0.058)		(0.000)	(0.099)		(0.000)
Single-scheme	3.705***	4.625***	3.346***	4.600***	5.105***	3.965***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO-DB-pension*Single-scheme	-3.171**		-2.312*	-0.587***		-0.547***
	(0.018)		(0.081)	(0.001)		(0.009)
CEO-aboveCAP-member*Single-scheme	2.087		2.279	-0.154		0.621
	(0.156)		(0.133)	(0.925)		(0.729)
CEO-DB-pension*CEO-aboveCAP-member*Single-scheme	3.098**		2.238*	0.583***		0.549***
	(0.021)		(0.092)	(0.001)		(0.009)
ln (CEO-Role-tenure)	0.539**		0.473*	0.576**		0.501*
	(0.031)		(0.065)	(0.019)		(0.054)
Accounting-background	-0.17		-0.348	0.283		-0.076
	(0.807)		(0.643)	(0.647)		(0.912)
CFO-DB-pension		0.429	-0.257		0.057**	0.016
		(0.208)	(0.457)		(0.018)	(0.437)
CFO-aboveCAP-member		0.301	-0.041		0.559	1.123
		(0.663)	(0.955)		(0.466)	(0.135)
CFO-DB-pension*CFO-aboveCAP-member		-0.349	0.307		-0.052**	-0.011
		(0.315)	(0.385)		(0.036)	(0.577)
CFO-DB-pension*Single-scheme		-0.373	0.337		-0.057*	-0.014
		(0.358)	(0.408)		(0.097)	(0.657)
CFO-aboveCAP-member*Single-scheme		0.705	1.23		0.673	1.201
		(0.633)	(0.436)		(0.668)	(0.450)
CFO-DB-pension*CFO-aboveCAP-member*Single-scheme		0.023	-0.705*		0.030	-0.01
		(0.957)	(0.099)		(0.389)	(0.754)
ln (CFO-Role-tenure)		-0.258	-0.142		-0.243	-0.396
		(0.367)	(0.6310		(0.410)	(0.196)
%Equity	-0.105***	-0.109***	-0.106***	-0.104***	-0.112***	-0.107***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.433***	-0.286*	-0.402***	-0.544***	-0.354**	-0.477***
	(0.010)	(0.056)	(0.010)	(0.001)	(0.022)	(0.002)
Maturity	0.522***	0.553***	0.489***	0.682***	0.545***	0.611***
	(0.001)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.151	-0.188	0.157	-0.545*	-0.297	-0.513*
	(0.612)	(0.553)	(0.597)	(0.054)	(0.370)	(0.084)
Leverage	-0.045**	-0.045**	-0.051***	-0.042**	-0.045**	-0.035*
	(0.012)	(0.014)	(0.004)	(0.017)	(0.019)	(0.056)
ROA	-0.023	-0.059*	-0.046	-0.035	-0.056*	-0.052*
	(0.455)	(0.058)	(0.142)	(0.243)	(0.085)	(0.100)
Dividends	0.151**	0.181***	0.186***	0.124**	0.189***	0.177***
	(0.017)	(0.005)	(0.005)	(0.035)	(0.004)	(0.005)
Cash	0.074**	0.083***	0.091***	0.086***	0.081**	0.100***
	(0.026)	(0.009)	(0.007)	(0.008)	(0.015)	(0.002)
_cons	91.097***	96.777***	91.926***	98.107	97.484	98.031
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,090	1,156	1,048	1,065	1,098	1,005
Number of companies	128	130	126	128	130	127
Wald chi2	943.09	1046.21	975.05	1028.04	914.39	958.92
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

DB pensions, age and the funding of DB schemes (H3)

Table 4.10 reports results examining hypothesis 3. Hypothesis 3 predicts that *%FR* will be higher when CEO approaches retirement and has a DB pension implying a positive relationship. To investigate this, this study follows the previous study methodology (Kabir, Li, and Veld-Merkoulova, 2017). Kabir, Li, and Veld-Merkoulova (2017) argue that in the UK the default age for retirement was 65 years before 2011, but CEOs can choose to retire earlier for many different reasons. Conyon and Florou (2006) state that identifying retiring CEOs is a complicated task because companies usually do not announce the true reason behind their departures. Cassell et al., (2013), using a sample of US firms, find that the average age of CEO at retirement is 61 years and approximately 65% of CEOs retire when they are at least 60 years old. As the actual retirement date of CEOs is not known, Kabir, Li, and Veld-Merkoulova (2017) use a mechanical approach by using the cut-off age that corresponds to the 75th percentile of CEO age in the sample. The 75th percentile of CEO age in the sample used in this study is 57.2 years which is similar to Kabir, Li, and Veld-Merkoulova (2017) study. Therefore, this study adopts 58 years as the cut-off rate to identify those CEOs who are close to retirement.

Results for CEOs with short (CEOs who are 58 years or older) career horizon and others (CEOs younger than 58 years) are reported in Table 4.10. It is observed that coefficient estimates of *CEO-Annual-pension* aboveCAP-member* in Models (1) - (4) are all positive and statistically significant. However, the magnitude of the coefficients is much larger for the sample of CEOs with a shorter career horizon. For example, while, for the sample of CEOs younger than 58 years, a 1% increase in *Annual-pension* above the compensation cap is associated with 0.993 in the *%FR* (Model 1), for the sample of CEOs with short career horizon a 1% increase in *Annual-pension* above the compensation cap is associated with 10.114% in the *%FR* (Model 1). The estimated coefficients for *CEO-Total-pension* is also larger for the CEOs with short career horizon that equals to 0.425% compared to 0.050% for the CEOs younger than 58 years (Model 3). These findings suggest that DB schemes are better funded in companies whose CEOs participate in DB schemes and who are closer to retirement. Controlling for *CFO-Annual-pension* (Model 2) or *CFO-Annual-pension* (Model 4) do not change the conclusion as the estimated coefficients remain positive and statistically significant and the magnitude of the coefficient for the sample of CEOs with short-term career horizon is larger than for the rest of CEOs. In aggregate, these findings indicate that CEOs associate with higher funding when CEOs are closer to retirement and have DB pensions as they appear to be particularly concerned with the security of their pensions. These findings provide evidence in favour of hypothesis 3.

With respect to other variables, it is observed that *Maturity* positively associates with the *%FR* in the sub-sample of CEOs with long career horizon. The disappearance of the association between *Maturity* and the *%FR* for the sub-sample of CEOs who are 58 years or older possibly suggest that older CEOs become less incentivised to keep making higher pension contributions as they reduce the resources for other needs and these cash outgoing do not bring direct benefits to CEOs.

It is also observed that *Leverage* negatively associates with *%FR* in the both sub-samples. However, the magnitude of the estimated coefficients is larger for the sub-sample of companies whose CEOs approached closer to retirement. This could suggest that companies take more pension risk by underfunding the pension scheme when their CEOs are approaching closer towards the end of their working life. As CEO approaches closer to retirement, the incentive to underfund the DB scheme may increase because CEOs may behave in a way that increases the benefits in the short-run.

It also has been found that *ROA* negatively associates with the *%FR* in the sample of CEOs with short career horizon. This finding also implies that CEOs approaching closer to retirement may seek to use earned returns to meet their personal interests. As a result, they spend less on pensions leaving more money for their personal needs.

Moreover, there is evidence that *Dividends* positively associate with *%FR* for the sample of CEOs younger than 58 years. This finding suggests that younger CEOs may use *Dividends* to reduce the deficit to minimise the consequences of underfunding (e.g. financial constraints and increased risk of bankruptcy) that could leave CEO with no job and even undermine the CEO reputation. As older CEOs may care less about future job security, *%FR* may become less sensitive to *Dividends* that explains the disappearance of a positive relationship between *%FR* and *Dividends* in pre-retirement years.

There is also evidence that *Ln (Company-size)* negatively associates with *%FR* in the sample of CEOs with short career horizon. Larger companies tend to have larger DB schemes that could also have a larger deficit that potentially explains the negative relationship. As the estimated coefficient is only significant in the sample of CEOs older than 58 years, this might suggest that CEOs take more pension risk when they are closer to retirement. This is because large companies are likely to have higher pension costs that could significantly constrain the resources for other company's need. This finding suggests that CEO becomes more risk-seeking near retirement that may reduce the need to underfund the scheme. There are no observed significant differences in other variables which are consistent across model specifications.

Table 4.9
FGLS results for funding of DB schemes (*%FR*) (H3)

This tables reports results from FGLS regressions in which dependent variable is Funding Ratio defined as the ratio of pension assets to the value of pension liabilities for the sub-sample of CEOs older/younger than 58 years. Models 1 to 2 in Panel A report results from regressions examining *Annual-pension* and Models 3 to 4 in Panel B report results from regressions examining *Total-pension.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A

Dependent variable - %FR
Explanatory pension variable - Annual-pension

	Model 1		Model 2	
	CEO older than 58 years?			
	Yes	No	Yes	No
CEO-Annual-pension	-10.103***	-0.678**	-9.021***	-0.292
	(0.000)	(0.037)	(0.000)	(0.329)
CEO-aboveCAP-member	-3.285***	-4.495***	-1.533	-4.100***
	(0.001)	(0.000)	(0.162)	(0.000)
CEO-Annual-pension * CEO-aboveCAP-member	10.114***	0.993***	8.477***	0.605**
	(0.000)	(0.004)	(0.000)	(0.054)
ln (CEO-Age)	2.599	5.423*	20.543**	8.901***
	(0.779)	(0.054)	(0.040)	(0.002)
Accounting-background	1.449	-0.414	1.328	-1.229*
	(0.566)	(0.517)	(0.584)	(0.073)
CFO-Annual-pension			-1.166	0.323
			(0.141)	(0.151)
CFO-aboveCAP-member			-0.020	1.975***
			(0.989)	(0.008)
CFO-Annual-pension * CFO-aboveCAP-member			1.442*	-0.354
			(0.061)	(0.160)
ln (CFO-Age)			-14.893***	-8. 771***
			(0.004)	(0.000)
Single-scheme	1.940*	4.003***	1.871	3.638***
	(0.059)	(0.000)	(0.192)	(0.000)
%Equity	-0.139***	-0.100***	-0.132***	-0.105***
	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.508***	-0.414**	-0.348	-0.360**
	(0.008)	(0.024)	(0.125)	(0.040)
Maturity	0.405	0.499***	-0.027	0.512***
	(0.234)	(0.004)	(0.943)	(0.003)
ln (Company-size)	-1.692***	0.302	-1.532**	0.479
	(0.000)	(0.281)	(0.022)	(0.102)
Leverage	-0.265***	-0.066***	-0.226***	-0.060***
	(0.000)	(0.000)	(0.000)	(0.001)
ROA	-0.578***	-0.026	-0.504***	-0.030
	(0.000)	(0.425)	(0.000)	(0.364)
Dividends	0.096	0.164**	-0.089	0.170**
	(0.291)	(0.020)	(0.378)	(0.018)
Cash	0.122*	0.009	0.132	0.002
	(0.090)	(0.785)	(0.114)	(0.949)
_cons	112.935***	66.513***	107.601***	84.748***
	(0.002)	(0.000)	(0.004)	(0.000)
Number of obs	184	877	169	850
Number of companies	52	118	47	116
Wald chi2	1789.08	928.02	74490.89	923.35
Prob > chi2	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes

Table 4.9. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual-pension

	Model 3		Model 4	
	CEO older than 58 years?			
	Yes	No	Yes	No
CEO-Total-pension	-0.428***	-0.028	-0.452***	0.003
	(0.000)	(0.295)	(0.000)	(0.886)
CEO-aboveCAP-member	-2.150	-4.706***	-2.259	-4.469***
	(0.167)	(0.000)	(0.142)	(0.000)
CEO-Total-pension *CEO-aboveCAP-member	0.425***	0.050*	0.422***	0.018
	(0.000)	(0.061)	(0.000)	(0.408)
ln (CEO-Age)	-12.610	6.176**	7.285	7.953***
	(0.112)	(0.024)	(0.517)	(0.004)
Accounting-background	-2.491	-0.060	-3.091**	-1.237*
	(0.200)	(0.925)	(0.040)	(0.084)
CFO-Total-pension			-0.130	0.019
			(0.154)	(0.268)
CFO-aboveCAP-member			0.493	3.901***
			(0.801)	(0.000)
CFO-Total-pension *CFO-aboveCAP-member			0.164*	-0.030
			(0.051)	(0.107)
ln (CFO-Age)			-24.528***	-10.723***
			(0.001)	(0.000)
Single-scheme	3.068*	4.437***	0.553	4.119***
	(0.065)	(0.000)	(0.754)	(0.000)
%Equity	-0.121***	-0.104***	-0.092***	-0.117***
	(0.000)	(0.000)	(0.010)	(0.000)
Closure-to-FA	-0.785***	-0.394**	-0.588**	-0.360**
	(0.000)	(0.035)	(0.022)	(0.036)
Maturity	-0.408	0.730***	-0.541**	0.811***
	(0.149)	(0.000)	(0.061)	(0.000)
ln (Company-size)	-2.750***	0.034	-2.989***	0.156
	(0.000)	(0.909)	(0.001)	(0.600)
Leverage	-0.226***	-0.057***	-0.251***	-0.038**
	(0.000)	(0.001)	(0.000)	(0.041)
ROA	-0.450***	-0.026	-0.553***	-0.019
	(0.000)	(0.372)	(0.000)	(0.543)
Dividends	0.211*	0.146**	0.063	0.130*
	(0.077)	(0.018)	(0.704)	(0.060)
Cash	0.158**	0.021	0.071	0.017
	(0.044)	(0.534)	(0.444)	(0.615)
_cons	177.922***	66.049***	209.312***	98.269***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	182	853	159	816
Number of companies	48	119	44	118
Wald chi2	25739.32	857.95	40621.29	988.18
Prob > chi2	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes

Robustness check

To check the sensitivity of the results, this study uses an extended sample. The extended sample includes companies over the 2004-2015 period and covers the period when the PPF started to offer protection of DB pensions up to compensation cap (2006-2015) and the period with no protection of DB schemes (2004-2005). The variable *aboveCAP-member* takes the value 0 for CEOs or CFOs with pension below the compensation cap and CEOs or CFOs with DB pensions in 2004 and 2005 for any size and 1 for CEOs or CFOs with pension above the compensation cap. The results obtained from regressions using the extended sample are similar in direction and significance of the coefficients to those obtained using the 2006-2015 sample (Table 4.11). The results are also robust when controlling for the board characteristics, e.g., number of board members, board independence, and whether or not CEO is also served as a Chairman in the company (results are not tabulated). The results also remain consistent when using all companies in the sample (e.g., including financial companies) (results are not tabulated) .

For hypothesis 3, a further check is done by removing from the sample CEOs who already retired because CEOs DB pensions become fully protected after they retire. As a result, this could reduce the incentive to look after the DB schemes. Removal of CEOs who have already retired reduces the sample[18], but this modification does not change the previous findings (results are not tabulated). An additional check is performed by introducing an interaction term between *Age* and *Annual-pension and Age* and *Total-pension*. This eliminates the need to identify the cut-off age. The results also reveal a positive and statistically significant coefficient suggesting that older CEO with DB pension associated with higher funding of DB schemes, as

[18] The sample reduces from 188 to 156 observations when *Annual-pension* is included in the model and from 169 to 138 observations when *Total-pension* is included in the model.

consistent with the hypothesis and previous findings (results are also not tabulated). These additional results support the core findings of this study.

4.5. Conclusion

This study integrates insights from the agency theory to examine the relationship between CEO inside debt incentives and the funding levels of the pension schemes. Using a sample of UK companies with DB pension arrangements, it has been found that, in line with the prediction, CEO DB pension is positively associated with funding levels of DB schemes. The positive relationship suggests that DB pension schemes are better funded when CEOs participate in DB schemes, e.g., when they accrue DB pensions. Further analysis reveals that the CEOs with shorter time horizon and DB pensions associate with higher pension funding levels. This suggests that the presence of DB pensions in compensation packages of CEOs induce them to act in a way to preserve their DB accruals. Moreover, the positive and statistically significant coefficients on interaction term, CEO DB pension and *Single-scheme* (companies which have only one DB scheme) suggest that CEOs are particularly concerned about the funding of the schemes in which they participate. This, however, has implications for other DB schemes. In particular, CEOs with DB pensions may overfund the scheme in which they participate and take no actions with respect to other schemes or even underfund them.

This study also investigates the association between CFO inside debt incentives and the funding levels of DB pension schemes. Specifically, this study tries to understand whether CFO inside debt incentives, similar to CEOs, contribute to the better funding levels of pension schemes. The results suggest that CFOs DB pensions are not associated with the funding levels of DB schemes, suggesting that the role of CFO inside debt incentives are less influential compared to CEOs.

Taken together, these findings suggest that CEOs incentives play a more important role. Although CFOs are in charge of financials, CEOs might exert significant influence over CFOs decisions to induce CFOs to make decisions to regard the interests of CEOs which are not always in interests of CFOs themselves. Overall, this study extends and contributes to the literature on the determinants of funding levels of corporate DB pension schemes by providing empirical evidence that CEOs with inside-debt incentives, but not CFOs, are important for the financial health of DB pension schemes. These results may help company board, policymakers and regulators understand the roles of CEOs and CFOs play in the company.

This study, however, have some limitations. These limitations and direction for future research are discussed in greater detail in the final section to this thesis.

Chapter 5

Managers’ inside-debt incentives and funding policy of deficit of Defined-Benefit pension schemes

The Pension Act of 2004 was enacted to help improve the management of DB pension schemes following the number of issues highlighted in the Myners Report (2001). As a result, the statutory funding requirement, MFR, imposed by the previous Pension Act 1995 was replaced by a new scheme-specific "statutory funding objective". New scheme-specific funding requirement prescribes companies to make additional pension contributions (deficit-repair contributions (DRCs)) if there is a deficit. However, under new funding requirement companies have more flexibility since there are no time prescriptions over which the deficit should be eliminated. This means that companies are allowed to adjust DRCs to their and pension scheme circumstances. In other words, new funding requirements is up to companies to decide appropriate funding targets and deficit recovery periods. However, such flexibility leaves scope for managerial discretion, and this study examines whether CEOs and CFOs inside debt incentives generated by DB pensions are associated with a higher probability of making DRCs.

Managerial incentives have been found to influence the funding levels of DB pension schemes (Begley, Chamberlain, 2014; Anantharaman and Lee, 2014; Chapter 4 study). However, no research examines whether or not managerial incentives associated with DRCs because there is no data available for download. To understand the underlying motives of making DRCs is of relevance given the importance of those contributions on pension funding and the security and sustainability of DB pension schemes.

Moreover, it is unclear whether these additional payments are indeed effective at reducing the deficit. For example, the research conducted by Mercer shows that companies in the FTSE350 paid about £20 billion in both normal and deficit reduction contributions during March 2011-March 2012, but the deficit for the same period increased by £17 billion (The Economist, 2012). Moreover, the recent failures of large companies with DB schemes whose deficit had been growing continuously despite paying DRCs, also raise a question about the effectiveness of these additional contributions on the pension funding. For example, British Home Store (BHS) failed in 2016, leaving a pension scheme in deficit by more than £500 million. One of the largest construction company sponsoring over 28,000 members across 13 pension schemes, Carillion, failed at the beginning of 2018. Despite that company had a recovery plan and paid DRCs on annual basis (BHS also had made additional contributions towards deficit reduction), the actual deficit was persistent and had grown at worst from around £25 million in 2007 to £240 million in 2010 to £498 in 2014 and £587 in 2017. At the time of the collapse, the actual deficit is estimated to sit at around £900 million, according to the PPF estimates (Reuters, 2018). While the main objective of this study is to examine whether CEO/CFO inside debt incentives associated with the higher probability of making DRCs, it also supplements the previous research regarding determinants of DB schemes funding levels (Chapter 4 study). In particular, this study allows establishing whether DRCs were effective at reducing the deficit.

Building upon the prior research arguments and the agency theory that holdings of DB pensions create strong incentives to manage the pension risk, this study hypothesizes that CEO/CFO DB pensions are associated with a higher probability of making DRCs. Examining this conjecture, this study finds that CEO participation in DB scheme is associated with a higher probability of making DRCs, suggesting that companies are more likely to make DRCs to restore the funding level when their CEOs have DB pensions. These findings imply that CEOs become more cautious about the security of their DB pensions when the pension scheme is underfunded. To reduce the deficit in the pension scheme, companies might to seek to make DRCs that also reduces the riskiness of the CEOs DB pensions. However, the analysis fails to find any relationship between CFO participation in DB scheme and DRCs, suggesting that CEO incentives are more influential. This study further documents that retiring CEOs with DB pensions are also associated with a higher probability of making DRCs suggesting that CEOs with DB holdings become more concerned about the security of their pensions as whey get closer to retirement.

This study also makes several important contributions. First, this study contributes to the literature regarding the determinants of the funding policy of DB pension schemes - DRCs. The results suggest that managerial inside-debt incentives are also important for funding policy of deficit of DB pension schemes highlighting that the company is more likely to make DRCs to reduce the deficit when the CEO has a DB pension. Again, these results can be used by regulators to improve the regulation of corporate pension schemes to ensure that companies whose CEOs do not participate in DB schemes also make DRCs to reduce the deficit in DB schemes. Second, this study shows that CEOs with DB pensions which are associated with a higher probability of making DRCs are also positively associated with the pension funding. This suggests that DRCs are effective at reducing the deficit at least in companies whose CEOs have DB pensions. Third, this study also contributes to the existing literature on usefulness of inside-debt at reducing the risk-taking by CEOs (Deng, He, Kong, and Zhang, 2019; Bennett, Guntay, and Unal, 2015; Srivastav, Armitage, Hagendorff, and King, 2018; Freund, Latif, and V. Phan, 2018; Kabir, Li, and Veld- Merkoulova, 2013; Cassell, Huang, Sanchez, and Stuart, 2012; Sundaram and Yermack, 2007). Fourth, this study contributes to the existing literature on the role of CEOs and CFOs. In particular, this study documents that despite that CFO is a head of the finance department, the CEO is the key executive who is involved in the decision making with regard to the funding policy of DB schemes. This might suggest that CFO has a more functional role in the company who supports the CEO rather than an executive who makes the decisions. Fifth, this study provides evidence on the interactive relationship between career horizon, DB pensions and DRCs by documenting that DB pensions change the CEO behaviour as they get closer to retirement. Overall, these findings can be used by regulators to improve the management of DB schemes. Boards also should be aware of the possible future implications of CEOs disincentives to reduce the deficit. Apart from this, boards might rely on these study findings in designing the optimal compensation contracts taking into account that CEOs inside incentives prevail over the CFOs inside debt incentives and that behaviour of CEOs with short career horizon tend to change as they approach closer to retirement.

The remainder of this chapter is organised as follows. Section 5.2 discusses hypotheses. Section 5.3 describes the research design and Section 5.4 presents results. Section 5.5 concludes.

5.2. Hypotheses

When there is a deficit in the pension scheme, DB pensions become more risky as the company may not be able to pay the full amount it promised. The company may make DRCs to reduce the deficit and, therefore, the riskiness of DB pensions. If the pensions are relatively important compared to other types of compensation, the CEOs/CFOs are more likely to reduce the riskiness of their pensions by making DRCs, as consistent with the agency theory. While the decision to pay DRCs can help to secure the CEOs/CFOs DB pensions, additional pension contributions are costly to management and executives with no inside-debt may not fully benefit from making DRCs. This is because additional pension contributions reduce the cash resources, which otherwise might be used for capital investment (Rauh, 2006). Moreover, additional pension contributions reduce the current period income leading to lower reported earnings that may affect the executive short-term pay such as bonuses. There is also an anecdotal evidence regarding some CFOs' perceptions about regular contributions and DCRs. Back in 2013, Carillion's former CFO considered putting cash into the company's pension deficit a "waste of money", according to the minutes of a meeting between Trustee representatives and the Pensions Regulator regarding failure to agree the 2011 valuations[19]. Carillion's former CFO had no DB pension in the company's pension scheme.

Following the discussion above, this study proposes that while managers with no DB pensions may be more reluctant to make DRCs, companies are more likely to make DRCs when their executives have DB pensions. This proposition is indirectly supported by previous studies showing that DB pension schemes are better funded in companies whose executives participate in DB schemes (Begley, Chamberlain, 2014; Anantharaman and Lee, 2014; Chapter

[19] The attendance note is available at https://www.parliament.uk/documents/commons-committees/work-and-pensions/Carillion/Carrillion.pdf.

4 study). However, taking into account that the PPF guarantees to pay pensions up to a certain amount (compensation cap), as has been previously discussed in Chapter 4, it is expected that companies are more likely to make DRCs when their executives have accrued DB pensions above the compensation cap.

Hypothesis 1: CEOs with DB pensions above the compensation cap are associated with a higher probability of making DRCs compared to CEOs with non-DB pension arrangements

Hypothesis 2: CFOs with DB pensions above the compensation cap are associated with a higher probability of making DRCs compared to CFOs with non-DB pension arrangements

Similar to the previous chapter, this study also tests whether the probability of making DRCs is increasing in the age of a CEO with DB pension above the compensation cap. As previously discussed in Chapter 4, pensions become more important as executive approaches retirement (Sundaram and Yermack, 2007). As underfunding makes pension accruals less secure, a retiring executive with DB pension arrangements more likely to make DRCs to reduce the deficit in order to secure DB pensions. Study in Chapter 4 indirectly supports this conjecture by documenting that the effect of DB pensions on the funding of DB schemes is stronger for retiring CEOs. Moreover, the study of Kabir, Li, and Veld- Merkoulova (2017) shows that DB component of executive compensation leads older CEOs to decrease the R&D possibly suggesting that CEO with DB pension tend to reduce the deficit at the expense of R&D. Therefore, it is expected that closer to retirement CEO with DB pension above the compensation threshold is associated with a higher probability of making DRCs as CEO becomes more cautious about the security of DB pension as he gets closer to retirement.

Hypothesis 3 (CEO-age hypothesis): the probability of making DRCs is increasing in the age of a CEO with DB pension as CEO becomes more cautious about the security of DB pension as he gets closer to retirement.

Similar to previous Chapter, the age hypothesis has been dropped for CFOs because there is insufficient number of observations for the sample of CFOs approaching closer to retirement.

5.3. Research design

5.3.1. Variables

Dependent variable

This study focusses on funding policy of deficit of DB pension schemes, additional contributions towards deficit reduction, rather than on funding positions themself. Pension contributions can be divided into two categories: (i) normal contributions which are paid to match the present value of future benefits (increase in pension) that employees earned over the year (number of assumptions have to be made, e.g., future increase in salary, discount rates etc.) and (ii) DRCs which the sponsoring company is expected to pay in order to close or, at least reduce, the gap between estimated value of scheme assets and projected pension obligations. Given that these contributions differ significantly in their stated objectives, only DRCs payments are considered as a measure of funding the deficit in DB schemes. DRCs defined as an amount paid in excess to normal contributions that the company makes to match the value of the increase in pensions. The dependent variable is a binary variable (*DRCs*) that takes the value of 1 if the company made DRCs and 0 otherwise.

Data on DRCs has not been previously used as it not publicly available for download. However, the information on *DRCs* is reported by the majority of companies and annual reports were scrutinised to obtain records on actual *DRCs*. Although, companies do not always use "*DRCs*" to describe additional contributions towards deficit reduction, they, however, clearly state the amount of additional contributions they make to "*recover the funding levels*" or "*reduce the pension deficit*" and hence these contributions are classified as *DRCs*. The data on *DRCs* have been collected for majority of companies in the FTSE 350 index with DB pension schemes: only 3 companies were excluded from the sample given that these companies state that additional contributions were made towards deficit but do not report the value of these contributions.

CEO/CFO inside-debt incentives

As hypothesized, DB pensions may incentive CEOs and CFOs to make DRCs to reduce the risk associated with DB pensions. This study uses several measures of DB pensions. First, this study introduces binary variable *aboveCAP-member* that equals to 1 if CEO/CFO is a member of the DB pension scheme with pension above the compensation cap and 0 otherwise. Having an independent binary pension variable will determine the change in the probability associated with having a DB pension above the compensation cap compared to the rest. Second, similar to Chapter 4, it uses *Annual-pension* (the ratio of annual pension to total wealth) and *Total-pension* (the ratio of total accrued pension to total wealth) to determine the association between a 1% change in pension variables and the probability of making DRCs.

Table 5.1 reports the number of companies in the FTSE 350 that have made DRCs to reduce the deficit. It shows that 166 companies that represent around 80 per cent of the total number of companies in the sample have made at least one payment over the 12 years observation period. Around 6 per cent or 12 companies of the total number of FTSE 350 companies in the sample have made DRCs each year over the period 2004 – 2015 and 23 companies or 11 per cent of companies have made DRCs only once. There are 77 companies which have made 7 or more payments over the period 2004 – 2015 and 89 companies which have made 6 or less. Other 41 companies that represent the remaining 20 per cent of the total sample have made no DRCs at all over the 12 years observation period. Table 5.2 reports the number of companies with underfunded schemes and the number of companies which decided to pay DRCs. It shows that the number of FTSE 350 companies with underfunded DB schemes (*FR<100%)* decreased from 94% in 2004 to 69% in 2015 while the number of companies which decided to pay DRCs has increased from 19 per cent in 2004 to 50 per cent in 2015 reaching a peak of 57 per cent in 2011. The analysis of DRCs also indicates that since 2010 nearly every second company in the FTSE 350 have paid DRCs towards deficit reduction. These numbers suggest that while the number of companies which deal with deficit increased significantly, there are companies which do not pay DRCs despite having a deficit in the pension schemes.

Table 5.1
The number of FTSE 350 companies which have/have not made DRCs over the period 2004 – 2015. The frequency of deficit repair contributions represents the number of annual payments made by companies towards deficit reduction.

Frequency of DRCs payments	Number of companies	Percent
12	12	5.74
11	16	7.66
10	17	8.13
9	13	6.22
8	13	6.22
7	11	5.26
6	9	4.31
5	14	6.70
4	14	6.70
3	13	6.22
2	13	6.22
1	23	11.00
0	41	19.62

Table 5.2

The number of FTSE 350 companies with underfunded DB schemes and which have made deficit repair contributions, DRCs, over the 2004 - 2015 period.

Year	Number of companies in the sample	Number of companies with underfunded DB schemes (FR<100%)	% of companies with underfunded DB schemes (FR<100%)	Number of companies which made DRCs	% of companies which made DRCs
2004	166	156	93.98	31	18.67
2005	172	163	94.77	62	36.05
2006	183	157	85.79	90	49.18
2007	191	141	73.82	87	45.55
2008	188	144	76.60	79	42.02
2009	190	173	91.05	88	46.32
2010	191	171	89.53	97	50.79
2011	193	154	79.79	110	56.99
2012	201	166	82.59	107	53.23
2013	201	151	75.12	103	51.24
2014	203	153	75.37	101	49.75
2015	201	138	68.66	101	50.25

Other variables

Other variables are similar to the variables used in the previous Chapter 4. These include tenure in role, tenure in company, time on board, age and accounting background. In the previous chapter, it was argued that long-tenured managers develop the company-specific human capital (Harris and Helfat, 1997) that is more difficult for the board to monitor (Lado and Wilson, 1994). As a result, manager have greater discretion in resources allocation and decision making. Moreover, the age originates with the risk preferences and the manager might be less inclined to increase the risk of the company as he approaches closer to retirement (Sundaram and Yermack, 2007). Third, long-tenured managers more likely to have DB pensions as DB pensions were a common form of retirement arrangements until recently. Having DB pensions more likely to make the CEO and CFO to be more cautious about the funding of the DB scheme and make necessary decisions to ensure the recipience of the promised level of pensions. Therefore, it is expected that the CEO/CFO *tenure* is associated with a higher probability of making DRCs in order to reduce the risk associated with pension deficit in the scheme. The results from previous chapter show that CEO tenure in role is positively associated with the higher funding levels of DB pension schemes indirectly supporting the prediction made above. This study also separately controls for CEO/CFO tenure in the company (*Company-tenure*) and time on board (*Board-tenure*) and *Age*.

Similar to the study in Chapter 4, this study also controls for the effect of whether or not the CEO has finance/accounting education (*Accounting-background*). CEOs with accounting education more likely to have a higher level of financial expertise to understand the implications of having a deficit in DB scheme. For example, pension deficit may lower company earnings (Franzoni and Marin, 2006), lower credit rating (Mckillop and Pogue, 2009) or increase the cost of capital (Cambell, Dhaliwal and Schwartz, 2012. Therefore, having an accounting background may encourage CEOs to make DRCs to reduce pension risk in order to avoid or at least lessen the negative consequences in the future. Therefore, it is expected that CEO *Accounting-background,* which takes the value of 1 when the CEO has accounting education or previously served as CFO and 0 otherwise, associates with a higher probability of making DRCs. The results presented in the previous chapter, however, fails to find any statistically significant relationship between CEO *Accounting-background* and the funding levels of DB pension schemes.

Other variables include company size *Ln (Company-size)*, *Leverage*, *ROA*, *Dividends* and *Cash.* How these variables relate to the funding levels of DB pension schemes was discussed in the previous chapter. The direction of these coefficients is also not expected to change when considering DRCs. Therefore, it is predicted that *Ln (Company-size), ROA, Dividends* and *Cash* are associated with higher probability of making DRCs while *Leverage* is associated with lower probability of making DRCs.

Similar to previous study, pension scheme characteristics also include *Closure-to-FA*, *Maturity, %Equity* and *Single-scheme*. In closed schemes, there could be a shift of power more towards the scheme trustees whose function will be to continue to look after the interests of all scheme members to justify the reasons of closure the scheme. As a result, after the closure of the scheme to future accruals companies may consider starting to make DRCs in order to reduce the pension deficit. Moreover, the future of the closed DB scheme becomes more evident as it becomes possible to project the scheme's upcoming benefit payments with much greater certainty. This may incentives companies to make DRCs. Therefore, it is expected that *Closure-to-FA* associated with a higher probability of making DRCs. The positive relationship is also expected between DRCs and the *Single-scheme* as companies with *Single-scheme*, which tend to have better governance due to large size of *Single-scheme*s, may have established a better relationship with the pension scheme trustees to address the deficit challenges as they arise.

In an attempt to avoid making DRCs, company may intentionally increase the equity investments because a higher share of pension assets in equities increases the expected returns simultaneously decreasing the amount of pension contribution needed from the company (Gold, 2003). As a result, the company may determine that DRCs are not needed due to the high returns on pension assets that will help to reduce the deficit in the scheme. Therefore, it is expected that

%Equity is associated with a lower probability of DRCs. This study also controls for the funding levels of DB schemes (*%FR*). Given that DRCs are made to reduce the deficit, it is expected that *%FR* positively associate with DRCs. *%FR* is defined as the ratio of pension assets to pension liabilities (%). The variables names, their definitions and the data sources of the variables used in this study have been previously reported in Chapter 4.

Table 5.3 reports the pair-wise correlation. The high correlations are observed between CEO- and CFO- *aboveCAP-member, Annual-pension, Total-pension* and between CEO- and CFO- tenure *Role-tenure, Company-tenure* and *Board-tenure*. As these variables are used in the regressions alternatively, the strong association between these variables is not an issue. The results from the VIF estimates indicate that the degree of the variance of the estimated coefficients is not affected by the collinearity.

The pair-wise correlation shows that CEO-*aboveCAP* is positively associated with DRCs suggesting that being a member of DB pension scheme with an accrued pension above the compensation cap might be an important determinant of the funding policy of DB schemes. This implies that companies are more likely to make *DRCs* when CEO has accrued pension above the compensation cap, which is consistent with the hypothesis. However, the correlation coefficient is negative but not statistically significant between *CEO-Annual-pension* and *CEO-Total-pension* and *DRCs*. The possible explanation for this is that *CEO-Annual-pension* and *CEO-Total-pension* incorporate pensions which have different levels of risk that create different incentives even between the CEOs with DB pensions themselves. This highlights that it is important to take into account the riskiness of DB pensions. For CFOs, there is no significant correlation between CFO-*aboveCAP-member* and *DRCs* indicating that CFOs incentives might not be strong enough to influence the funding policy of deficit compared to CEOs.

Table 5.3

Pair-wise correlation. Correlations significant at the 5% level or better are denoted with *. Correlations exceeding 0.4 threshold are highlighted in bold.

	1	2	3	4	5	6	7	8	9	10	11	12	13
DRCs	1												
CEO-aboveCAP-member	0.0503*	1											
CEO-Annual-pension	-0.0253	**0.5729***	1										
CEO-Total-pension	-0.0108	**0.5837***	**0.9453***	1									
ln (CEO-Role-tenure)	-0.0497*	0.1477*	0.0197	0.0757*	1								
ln (CEO-Company-tenure)	-0.0721*	0.4780*	0.2990*	0.2992*	**0.6305***	1							
ln (CEO-Board-tenure)	-0.0961*	0.3318*	0.1551*	0.1814*	**0.7845***	**0.8750***	1						
ln (CEO-Age)	-0.0373	-0.0545*	0.0316	0.1081*	0.3401*	0.2513*	0.3259*	1					
Accounting-background	0.0437	0.0068	-0.0578*	-0.0613*	-0.0258	0.0016	0.0563*	-0.007	1				
CFO-aboveCAP-member	-0.0417	0.3289*	0.2161*	0.2257*	0.0227	0.1305*	0.1006*	-0.0048	-0.0031	1			
CFO-Annual-pension	-0.1026*	0.2230*	0.3271*	0.3153*	-0.0397	0.0579*	0.0048	-0.0455	-0.0704*	**0.6079***	1		
CFO-Total-pension	-0.0731*	0.1970*	0.2806*	0.3071*	-0.021	0.0514*	0.0027	-0.0217	-0.0725*	**0.6112***	**0.9159***	1	
ln (CFO-Role-tenure)	-0.0561*	0.1200*	0.0269	0.0333	0.3043*	0.2971*	0.3148*	0.1096*	-0.0546*	0.3932*	0.1608*	0.1895*	1
ln (CFO-Company-tenure)	-0.0807*	0.1575*	0.0822*	0.0780*	0.2887*	0.3383*	0.3256*	0.0775*	-0.0134	**0.5476***	0.3624*	0.3738*	**0.8177***
ln (CFO-Board-tenure)	-0.0688*	0.1142*	0.0417	0.0438	0.2987*	0.3065*	0.3218*	0.1207*	-0.0633*	0.3948*	0.1827*	0.2170*	**0.9686***
ln (CFO-Age)	0.0127	-0.0058	-0.044	-0.024	0.0880*	0.0623*	0.0733*	0.2077*	-0.1407*	0.1734*	0.0855*	0.1901*	0.4425*
Single-scheme	-0.0025	-0.1380*	-0.1136*	-0.1187*	0.0348	0.0363	0.0433	-0.0934*	-0.0215	-0.1093*	-0.0355	-0.0229	-0.0246
%Equity	-0.1270*	0.1331*	0.1527*	0.1464*	0.018	0.0726*	0.0733*	-0.0349	-0.0973*	0.0872*	0.0937*	0.0341	0.0616*
Closure-to-FA	0.1743*	-0.1939*	-0.1165*	-0.1191*	0.0881*	0.0518*	0.0826*	-0.0002	0.0293	-0.2121*	-0.1419*	-0.1348*	0.0359
Maturity	-0.0234	-0.0857*	-0.0516*	-0.0532*	-0.0098	-0.0793*	-0.0408	0.0595*	0.0760*	-0.0265	-0.0176	0.0042	-0.0228
Ln (Company-size)	-0.0489*	-0.0057	-0.0587*	-0.0382	-0.1075*	-0.1046*	-0.1036*	0.0701*	0.0474	0.1022*	-0.0759*	-0.0338	-0.0441
Leverage	-0.0963*	-0.0664*	0.0557*	0.0631*	-0.0753*	-0.1459*	-0.0913*	-0.0186	0.0763*	-0.0385	0.0053	0.0285	-0.1499*
ROA	0.0496*	0.1080*	-0.0312	-0.0206	0.1302*	0.1675*	0.1268*	-0.0224	-0.0578*	0.0623*	0.0044	-0.0042	0.1409*
Dividends	-0.0327	0.0389	0.0412	0.0268	0.0146	0.0485*	0.0182	-0.0066	-0.0342	-0.0243	0.0082	0.0075	-0.0375
Cash	-0.0716*	0.0795*	0.0189	0.0097	0.0218	0.0971*	0.0539*	0.0161	-0.0509	-0.0143	0.0655*	0.0374	-0.0113
%FR	0.1167*	-0.0847*	-0.1250*	-0.1189*	-0.0112	-0.0658*	-0.0683*	-0.0475*	-0.0033	0.0134	-0.0477*	-0.0179	0.0064

	14	15	16	17	18	19	20	21	22	23	24	25	26
ln (CFO-Company-tenure)	1												
ln (CFO-Board-tenure)	**0.8409***	1											
ln (CFO-Age)	0.3458*	**0.4794***	1										
Single-scheme	0.0254	-0.0064	-0.1272*	1									
%Equity	0.0480*	0.0700*	-0.1483*	0.0085	1								
Closure-to-FA	-0.0215	0.0285	0.0307	0.2159*	-0.0832*	1							
Maturity	-0.0135	-0.0159	0.1215*	-0.0755*	-0.2706*	0.0127	1						
Ln (Company-size)	-0.0081	-0.0574*	0.1485*	-0.2107*	-0.2142*	-0.1973*	0.1575*	1					
Leverage	-0.1502*	-0.1453*	-0.016	0.0146	-0.0555*	-0.0538*	0.1096*	0.2334*	1				
ROA	0.1427*	0.1315*	0.0204	0.0514*	0.1083*	0.0306	-0.0781*	-0.1981*	**-0.5629***	1			
Dividends	-0.0549*	-0.0398	-0.0297	-0.0566*	-0.0407	-0.0309	-0.0083	0.0127	0.3375*	-0.0700*	1		
Cash	0.0114	-0.0224	-0.0321	-0.0603*	-0.0106	-0.0147	-0.0369	-0.0609*	0.1738*	0.0187	**0.7834***	1	
%FR	-0.0053	-0.0016	-0.0028	0.1884*	-0.3071*	0.0850*	0.0485*	0.0641*	0.0129	-0.0482*	-0.0121	-0.0065	1

5.4. Results

5.4.1. Descriptive statistics

Table 5.4 presents the summary statistics for the variables used in this study. The first column of Table 5.4 presents descriptive statistics for companies which made no DRCs (*DRCs = 0*) and companies which made at least one payment towards deficit reduction respectively (*DRCs ≥ 1*). The statistics reveal that the mean value of CEO *Annual-pension* relative to the total CEO wealth is £1.83% for the sample of companies which made at least one DRCs and 0.97% for companies which did not make any DRCs. In pound value, the average CEO *Annual-pension* is £85.44 thousand for the sample of companies which made at least one DRCs and £44.85 thousand for companies which did not make any DRCs. These numbers indicate that CEOs in companies which made DRCs accumulated larger pensions both in pound value and relative to the total CEO wealth compared to CEOs in companies which made no DRCs all. CEOs in companies which made at least one DRCs also accrued larger *Total-pension* relative to the total CEO wealth (7.78% vs 27.80%) and larger *Total-pension* in pound value (£225.68 vs 1,408.26 thousand) compared to the companies which made no DRCs at all. The differences in means in these variables are statistically significant at the 1% confidence levels.

Comparing CEO tenure in role, company and on board between companies which made/made no DRCs payments, it appears that CEOs in companies which made no DRCs have longer *Role-tenure (*8.39 years (log 1.86 years) versus 5.45 years (log 1.61 years)*)*, *Company-tenure* (15.36 years (log 2.43 years) versus 11.20 years (log 2.20 years)) and *Board-tenure* (12.13 years (log 2.22) versus 8.14 years (log 1.97 years)) and compared to companies which made at least one DRCs. The average age of CEO is distributed more uniformly between sample companies which made at least one DRCs and between companies which did not make any DRCs payments (52.33 years (log 3.97 years) versus 53.13 years (log 3.98 years)).

The statistics for CFOs reveal that the mean value of *CFO Annual-pension* relative to the total CFO wealth is 1.93% for the sample of companies which made at least one DRCs and 0.78% for companies which did not make any DRCs. In pound value, the mean value of *CFO Annual-pension* is 40.20 thousand for the sample of companies which made at least one DRCs and 11.05 thousand for companies which did not make any DRCs. *CFO-Total-pension*, both relative to the total CFO wealth and in pound value is also higher in companies which made at least one DRCs payment (26.67% or £622.75 thousand versus 11.21% or £160.95 thousand). These statistics also suggest that the mean size of CFO *Annual-pension* is larger for CFOs in companies which made at least one DRCs payment compared to the companies which made no DRCs at all. The differences in these variables are also statistically significant at the 1% confidence levels. However, while the mean size of CFO *Annual-pension* is larger for CFOs in companies which made at least one DRCs payment (which is similar to CEOs), the average size of CFO *Annual* and *Total-pension* is less than 2 times smaller.

CFOs in companies which made no DRCs compared to the companies which made at least one DRCs payment are also had longer Role- (6.48 years (log 1.69 years) versus 5.18 years (log 1.57 years), Board (9.38 years (log 1.97 years) versus 7.60 years (log 1.84 years) and Company- tenure (7.13 years (log 1.75 years) versus 5.44 years (log 1.60 years). The difference between these variables across the two groups is smaller compared to the difference observed for CEOs. The average CFO Age does not differ significantly between the two groups of companies (49.91 years (log 3.91 years) versus 48.78 years (log 3.90 years)). However, it is observed that CFOs were, on average, 3 years younger compared to the CEOs.

Companies which did not make any DRCs payments compared to companies which made at least one DRCs, on average, were larger (log £7.95 million versus log £7.68 million), had higher *Leverage* (44.82% versus 41.13%), lower *ROA* (6.88% versus 8.74%), higher *Dividends* (12.27% versus 3.64%) and *Cash* (28.36% versus 8.59%).

Companies which did not make any DRCs payments also had lower %Equity (39.36% versus 49.49%) and lower %FR (78.31% versus 88.18%) compared to companies which made at least one DRCs. The average Closure-to-FA for companies which made no DRCs was 0.45 years compared to 0.76 years for companies which made at least one DRCs. The pension schemes in companies which made no DRCs were also more mature schemes (4.69% versus 3.65%).

For indicator variables, CEO-aboveCAP-member with the value of 1 constitutes around 47% in the companies which made at least one DRCs and 29% in the companies which made no DRCs at all. CFO-aboveCAPmember with the value of 1 constitutes around 39% in the companies which made at least one DRCs and 25% in the companies which made no DRCs at all. These statistics suggest that companies which made DRCs have a higher number of CEOs and CFOs who participate in DB schemes with the value of DB pensions exceeding the compensation threshold. Companies which made DRCs had a lower number of CEOs with Accounting-background. A number of single-pension schemes are higher in companies which made no DRCs (34%) compared to companies which made at least one DRCs payment (27%).

Table 5.4

Descriptive statistics. "*DRCs = 0*" reports statistics for the sample of companies which did not make any DRCs payments and "*DRC ≥ 1*" reports statistics for the sample of companies which made at least one DRCs payment and during 2004-2015 period.

	DRCs=0			DRC ≥ 1			T-test	
	Mean	**Median**	**SD**	**Mean**	**Median**	**SD**	**Diff in means**	**Sig.**
DRCs	0.00	0.00	0.00	0.58	1.00	0.49		
CEO characteristics								
CEO-Annual-pension (to wealth), %	0.97	0.00	2.54	1.83	0.02	3.55	-0.87***	0.002
CEO-Annual-pension, £	44.85	0.00	112.55	85.44	0.00	156.79	-40.59***	0.001
CEO-Total-pension (to wealth), %	7.78	0.00	30.06	27.80	0.00	60.89	-20.02***	0.000
CEO-Total-pension, £	225.68	0.00	690.41	1408.26	0.00	2900.45	-1182.58***	0.000
ln (CEO-Role-tenure), years	1.86	1.92	0.91	1.61	1.63	0.72	0.25***	0.000
CEO-Role-tenure, years	8.39	5.80	8.11	5.45	4.10	5.25	2.94***	0.000
ln (CEO-Company-tenure), years	2.43	2.75	0.99	2.20	2.28	0.83	0.23***	0.001
CEO-Company-tenure, years	15.36	14.60	11.35	11.20	8.80	8.97	4.16***	0.000
ln (CEO-Board-tenure), years	2.22	2.43	0.94	1.97	2.04	0.74	0.26***	0.000
CEO-Board-tenure, years	12.13	10.35	9.42	8.14	6.70	6.42	3.99***	0.000
ln (CEO-Age), years	3.98	3.97	0.14	3.97	3.97	0.11	0.01	0.105
CEO-Age, years	53.13	52.00	7.39	52.33	52.00	5.86	0.81**	0.050
CFO characteristics								
CFO-Annual-pension (to wealth), %	0.78	0.00	2.37	1.93	0.00	4.20	-1.15***	0.001
CFO-Annual-pension, £	11.05	0.00	28.86	40.20	0.00	75.39	-29.15***	0.000
CFO-Total-pension (to wealth), %	11.21	0.00	33.88	26.67	0.00	63.63	-15.46***	0.002
CFO-Total-pension, £	160.95	0.00	443.61	622.75	0.00	1402.91	-461.80***	0.000
ln (CFO-Role-tenure), years	1.69	1.70	0.84	1.57	1.59	0.72	0.13**	0.024
CFO-Role-tenure, years	6.48	4.50	5.57	5.18	3.90	4.77	1.30***	0.001
ln (CFO-Company-tenure), years	1.97	2.13	0.94	1.84	1.86	0.81	0.13**	0.033
CFO-Company-tenure, years	9.38	7.40	7.64	7.60	5.40	7.02	1.78***	0.002
ln (CFO-Board-tenure), years	1.75	1.74	0.88	1.60	1.65	0.73	0.15**	0.012
CFO-Board-tenure, years	7.13	4.70	6.16	5.44	4.20	4.96	1.68***	0.000
ln (CFO-Age), years	3.91	3.91	0.13	3.90	3.91	0.11	0.01	0.148
CFO-Age, years	49.41	49.00	6.49	48.78	49.00	5.55	0.63	0.103
Company-specific characteristics								
Ln (Company-size), £ mil	7.95	7.74	1.31	7.68	7.52	1.42	0.27**	0.011
Leverage, %	44.82	44.06	20.58	41.13	39.98	18.19	3.68***	0.009
ROA, %	6.88	6.22	10.31	8.74	7.81	8.90	-1.85***	0.007
Dividends, %	12.27	2.39	40.52	3.64	2.86	5.65	8.63***	0.000
Cash, %	28.36	5.56	96.97	8.59	6.27	8.27	19.77***	0.000
Pension-scheme characteristics								
%Equity, %	39.36	38.92	21.17	49.49	50.00	19.36	-10.13***	0.000
Closure-to-FA, years	0.45	0.00	1.52	0.76	0.00	2.02	-0.31**	0.024
Maturity, %	4.69	3.48	4.38	3.65	3.57	1.73	1.04***	0.000
%FR	78.31	79.20	19.04	88.18	88.48	12.74	-9.86***	0.000
Indicator variables								
CEO-aboveCAP-member	0.29	0.00	0.46	0.47	0.00	0.50	-0.18***	0.000
Accounting-background	0.28	0.00	0.45	0.16	0.00	0.37	0.12***	0.000
CFO-aboveCAP-member	0.25	0.00	0.44	0.39	0.00	0.49	-0.13***	0.001
Single-scheme	0.34	0.00	0.48	0.27	0.00	0.44	0.07**	0.036

5.5.1. Empirical results

This study examines the factors that influence the funding policy of DB pension schemes using a logit regression analysis with industry and year effects and clustered standard errors and a binary dependent variable that equals 1 if a company made a DRCs payment and zero otherwise. For continues variables, the coefficients represent the marginal effects of the probability (*dy/dx*) of making DRCs payment implied by the logit coefficient estimates that result from a unit change in the explanatory variables. For indicator variables, the coefficients represent the change in the probability associated with moving the indicator variable from 0 to 1. For ease interpretation of the results, odds ratios (*Odds*), that is, the exponential of each coefficient estimate is reported. It represents the factor change in odds for a unit increase in the explanatory variable. If the estimated factor change is less than 1, the impact is negative and if the change is positive, the impact is positive.

Tables 5.5-5.8 report the results examining the determinants of the funding policy of deficit of DB pension schemes. Hypotheses 1 and 2 predict that CEO and CFO DB pensions are associated with a higher probability of making *DRCs*. The results from the *Logit* provide strong support that CEO DB pension variable matter for DRCs, but the results fail to find any relationship between CFO DB pension variables and the probability of making DRCs. In particular, Table 5.5 reports results controlling for *CEO/CFO Role-tenure*. In Model (1) of Table 5.5 it is observed that *CEO-aboveCAP-member* is positively associated with the marginal probability of making DRCs payments. This finding suggests that CEOs with pensions above the compensation threshold are more likely to make DRCs to reduce the deficit in the pension scheme to secure their accruals, as predicted. The predicted probability of making DRCs is 2.302 times higher when CEO have DB pension accruals above the compensation limit compared to companies whose CEOs who have DB pensions below the compensation cap or those whose are not members of DB schemes: the estimated coefficient is statistically significant at 1% level. The results remain robust when controlling for CFO characteristics such as *CFO-aboveCAP-member* and *CFO-Role-tenure* (Model (3)): the predicted probability of making DRCs increases to 2.432 times (the estimated coefficient is statistically significant at 1% confidence level).

Model (2) of Table 5.5 reports results examining *CFO-aboveCAP-member*. *CFO-aboveCAP-member* is positive but not statistically significant, suggesting that when CFO is a member of DB pension schemes are less relevant for funding policy of DB schemes compared to CEOs. The results also remain insignificant when controlling for CEO characteristics such as *CEO-aboveCAP-member* and *CEO-Role-tenure* (Model (3)).

The results shown in Models (4) – (6) which include *CEO*- and *CFO- Annual-pension* and Models (7) – (9) which include *CEO*- and *CFO- Total-pension* allow to come to the similar conclusions. *CEO-Annual-pension* is positive and statistically significant at 5% level. It is estimated that a one per cent change in *CEO-Annual-pension* increases the probability of making DRCs by 2.1% (Model 4) and by 2% when also controlling for CFO characteristics (Model 6). *CEO-Total-pension* is also positive and statistically significant at 1% level. It is estimated that a one per cent change in *CEO-Total-pension* increases the probability of making DRCs by 0.2% (Model 7) and by 0.1% when also controlling for CFO characteristics (Model 9). *CFO-Annual*- or *Total- pension* remain insignificant across all model specifications shown in Table 5.5.

The results discussed above are consistent across other model specifications when controlling for *Company*- (Table 5.6) or *Board- tenure* (Table 5.7) or *Age (*Table 5.8): estimated coefficients for CEO pension related variables are positive and statistically significant, and estimated coefficients CFO pension related variables remain statistically insignificant in all specifications. The results estimated results in Tables 5.6 – 5.8 are shown Appendix to this thesis.

Overall, these results indicate that companies managed by CEOs who have DB pensions are predicted to have a greater probability of making DRCs compared to companies whose CEOs are non-DB members. The results, however, show that CFOs DB pensions are not related to DRCs, suggesting that CEOs incentives are more influential than those of CFOs.

These findings also supplement the findings discussed in the previous Chapter 4. While, this study findings show that CEO DB pensions are associated with higher probability of making DRCs, previous findings show that CEO DB pensions are associated with higher funding levels of DB pension schemes implying that pension schemes benefited from DRCs payments made by the companies.

With respect to other variables, it also has been found that CEO-*Role-tenure* associated with a lower probability of making DRCs. The negative association suggest that long-tenured CEOs are less likely to make DRCs than short-tenured CEOs. This finding contradicts with the prediction that tenure positively associates with the probability of making DRCs and the previous study findings (Chapter 4) that show that *Role-tenure* associates with the higher funding levels of DB pension schemes. The possible explanation for these contracting results is that long-tenured CEOs tend to take less pension risk by setting more accurate (less optimistic) pension assumptions that leads to the more accurate pension contributions needed to cover the cost of DB pensions. In particular, the companies may apply higher discount rate and set higher expected rates of return on pension assets which would lead to lower pension contributions needed from the company. Making lower contributions may result in higher deficit if, for example, the expected rates of return will not materialise. Previous stream of studies already discussed in this thesis show that companies have discretion over the pension assumptions and thus the size of pension contributions. As long-tenured managers more likely to have DB pensions as DB pensions were a common form of retirement arrangements until recently (as discussed in the previous chapters), long-tenured CEOs are expected to take less risk in respect to the pension schemes. Therefore, long-tenured CEOs may consider making the right pension contributions to cover the full cost of DB pensions that may negate the need to make DRCs as the pension scheme will be better funded. This explains why *CEO Role-tenure* associates with the higher funding levels of DB pension schemes but with lower probability of making DRCs. It is estimated that *ln* (*CEO-Role-tenure)* is associated with, depending on the specifications, 5.3%-6.2% decrease in the probability of making DRCs. While CEO *Role-tenure* correlates with CEO *Age* and it common not to include CEO age together with tenure (Coles, Daniel, and Naveen, 2006; Chakraborty, Sheik, and Subramanian, 2007; Hirshleifer, Low, and Teoh, 2012), it is also argued that the omission of CEO age may generate a bias on the coefficient of tenure (Chen and Zheng, 2014). Including both *ln (CEO-Role-tenure)* and *ln (CEO Age)* do not change the coefficient on *ln (CEO-Role-tenure)*: *ln (CEO-Role-tenure)* remains negative and statistically significant, suggesting that long-tenured take more risk regarding the pension scheme. Also, there is evidence that *ln (CEO-Company-tenure)* and *ln (CEO-Board-tenure)* also associate with the lower probability of making DRCs. The coefficients on *ln (CFO-Role-tenure)*, *ln (CFO-Company-tenure)* and *ln (CFO-Board-tenure)* are not statistically significant in any model specifications suggesting that CFO tenure is not associated with a probability of making DRCs.

There is an evidence that *Accounting-background* associates with a higher probability of making DRCs. This finding is consistent with the prediction. It was argued that CEOs with accounting background more likely to have a higher level of financial expertise to understand the implications of having a deficit in DB scheme. As a result, CEOs may consider making DRCs to reduce pension risk in order to avoid or at least lessen the negative consequences in the future.

In line with the prediction, the relationship between *%Equity* and probability of making DRCs is negative. The negative coefficients suggest that companies appear to increase the share of pension assets in equities to avoid paying DRCs payments to the schemes. This finding is consistent with Gold (2003) who argue that the allocation of pension assets to equities decreases the amount of pension contribution needed from the company through higher expected rates of return on pension assets (Bergstresser, Desai, and Rauh, 2006). Increasing *%Equity* to reduce the pension contributions more likely to lead to a higher deficit, which is consistent with findings obtained in Chapter 4. The estimates suggest that a 1% increase in *%Equity* increases the probability of making DRCs by more than 0.3%-0.4%, depending on the model specification: the estimated coefficients are statistically significant at least at 10% confidence levels in all model specifications.

Also, in line with the prediction *Closure-to-FA* positively relates to the marginal probability of making DRCs suggesting that companies after the closure seem to focus more on how to bring the scheme to full funding. First, this is because companies might be pressurised by the trustees to make DRCs to justify the scheme closure. Second, by paying DRCs company shows that it deals with the deficit in the scheme assuring pension regulators of its intention to reduce the risk and avoiding the possible intervention of regulators into the management of the scheme. However, the results from Chapters 4 suggest that *Closure-to-FA* negatively associates with the funding suggesting that DRCs might not be effective at reducing the deficit. For example, companies may make DRCs towards deficit reduction and reduce regular contributions needed to cover the ongoing cost of DB pensions. If so, DRCs will not reduce the deficit in the pension scheme as expected. The estimates suggest that a one -year increase in *Closure-to-FA* increases the probability of making DRCs by more than 4.1%-5.4%, depending on the model specification: the estimated coefficients are statistically significant at least at 5% confidence levels.

There is some evidence that *Dividend*s associated with a higher probability of making DRCs. The positive relationship suggests that companies are more likely to pay DRCs when they pay higher dividends, which is consistent with prior studies (Bunn, Mizen, and Smietanka, 2018; Liu and Tonks, 2012). This finding, however, implies that shareholders in a company with a pension deficit should anticipate that future dividends are likely to be reduced, which may also have implications for future stock prices of companies with underfunded DB schemes. Combining the evidence from Chapter 4, it appears that DRCs worked well at reducing the deficit as *Dividend*s also positively associated with the funding of DB schemes. It is estimated that a one per cent change in *Dividend*s increases the probability of DRCs by 1.7%-2.0%, depending on the specification.

While a positive relationship is predicted between *%FR* and DRCs, it appears that *%FR* is irrelevant for funding policy of deficit. This indicates that DRCs do not always associate with the higher funding levels, suggesting that companies might reduce regular pension contributions through pension assumptions manipulation which is insufficient to cover the cost of DB pensions that decreases the effectiveness of DRCs. Other variables are less important are for funding policy of deficit of DB pension schemes.

The results obtained from regressions using the extended sample (2004-2015) are similar in direction and significance of the coefficients to those obtained using the 2006-2015 sample (results are not tabulated). This supports the core findings of this study.

Table 5.5: Logit regressions of DRCs

This tables reports results from logit regressions on whether CEO DB pension holdings are related to the dependent variable DRCs that equals to 1 if the company made DRCs and 0 otherwise. Models 1 to 3 include a dummy variable *aboveCAP-member* that equals to 1 if CEO or CFO is a member of DB pension schemes with the pension above the compensation threshold. Models 4 to 6 include *Annual-pension* and Models 7 to 9 include *Total-pension*. Regressions reported in this table control for *Role-tenure*. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Standard errors are clustered at the company-level.

Dependent variable: DRCs (dummy)	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
CEO-aboveCAP-member	2.302***				2.432***													
	(0.005)				(0.004)													
CEO-Annual-pension								0.021**				0.020**						
								(0.029)				(0.042)						
CEO-Total-pension														0.002***				0.001**
														(0.006)				(0.019)
ln (CEO-Role-tenure)		-0.062*				-0.043		-0.053*				-0.047		-0.057*				-0.048
		(0.057)				(0.203)		(0.064)				(0.133)		(0.074)				(0.172)
Accounting-background	1.740*				1.778*		1.549				1.633		2.002**				1.897**	
	(0.095)				(0.097)		(0.153)				(0.118)		(0.012)				(0.028)	
CFO-aboveCAP-member			1.456		1.201													
			(0.220)		(0.545)													
CFO-Annual-pension										0.006		0.001						
										(0.489)		(0.955)						
CFO-Total-pension																0.001		0.000
																(0.181)		(0.606)
ln (CFO-Role-tenure)				-0.053		-0.038				-0.022		0.007				-0.030		-0.009
				(0.224		(0.347				(0.530		(0.839				(0.418		(0.797
Single-scheme	1.447		1.348		1.591		1.317		1.278		1.417		1.450		1.238		1.531	
	(0.303)		(0.404)		(0.177)		(0.395)		(0.456)		(0.268)		(0.261)		(0.523)		(0.185)	
%Equity		-0.004**		-0.004*		-0.004**		-0.004**		-0.003*		-0.004**		-0.004**		-0.003*		-0.004**
		(0.039)		(0.066)		(0.037)		(0.031)		(0.087)		(0.032)		(0.025)		(0.097)		(0.030)
Closure-to-FA		0.051**		0.044**		0.054***		0.041*		0.041**		0.041*		0.047**		0.046**		0.050**
		(0.014)		(0.030)		(0.009)		(0.054)		(0.046)		(0.054)		(0.023)		(0.026)		(0.015)
Maturity		0.020		0.014		0.017		0.019		0.014		0.019		0.009		0.011		0.012
		(0.378)		(0.560)		(0.475)		(0.327)		(0.522)		(0.360)		(0.654)		(0.625)		(0.570)
ln (Company-size)		-0.025		-0.019		-0.020		-0.036		-0.025		-0.033		-0.037		-0.030		-0.039
		(0.459)		(0.581)		(0.556)		(0.246)		(0.420)		(0.294)		(0.239)		(0.343)		(0.226)
Leverage		0.000		0.000		0.001		0.000		0.000		0.001		0.001		0.000		0.000
		(0.865)		(0.933)		(0.841)		(0.842)		(0.928)		(0.815)		(0.751)		(0.902)		(0.908)
ROA		0.005		0.005		0.005		0.007*		0.004		0.006*		0.007*		0.003		0.006
		(0.171)		(0.199)		(0.203)		(0.055)		(0.245)		(0.098)		(0.091)		(0.391)		(0.162)
Dividends		0.010		0.017*		0.016		0.010		0.020**		0.014		0.018*		0.021**		0.018*
		(0.346)		(0.087)		(0.131)		(0.307)		(0.027)		(0.138)		(0.071)		(0.026)		(0.063)
Cash		-0.006		-0.004		-0.004		-0.005		-0.004		-0.003		-0.002		-0.005		-0.002
		(0.143)		(0.317)		(0.322)		(0.189)		(0.261)		(0.464)		(0.558)		(0.205)		(0.556)
FR		-0.002		-0.003		-0.002		-0.002		-0.002		-0.002		-0.002		-0.001		-0.002
		(0.498)		(0.378)		(0.425)		(0.467)		(0.567)		(0.459)		(0.447)		(0.614)		(0.456)
Number of obs		1,171		1,162		1,130		1,224		1,299		1,179		1,201		1,240		1,137
Wald chi2		97.05		94.15		102.99		173.97		116.71		209.77		180.96		135.59		395.08
Prob > chi2		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000
Pseudo R2		0.1577		0.1424		0.1675		0.1581		0.1418		0.1619		0.1627		0.1421		0.1631

DB pension, age and funding policy of deficit (H3)

Tables 5.9 - 5.11 present the results for hypothesis 3. Hypothesis 3 predicts that the company is more likely to make DRCs when the CEO has a DB pension and who is near retirement. If this conjecture is true, it is expected that CEO pension related variables will be associated with higher probability making of DRCs for CEOs approaching closer to retirement. To identify CEOs who approach closer to retirement, 58 years is used as the cut-off point (similar to Chapter 4).

The results shown in Table 5.9 – 5.11 provide some statistically significant evidence in support of this hypothesis. According to the first two columns of Table 5.9, *CEO-aboveCAP-member* is both positive and statistically significant. However, the magnitude of the estimated coefficient is larger for CEOs who are 58 years old or older. It is estimated that closer to retire CEO with DB pension above the compensation threshold is nearly 3 times more likely to make DRCs than CEOs who are farer to retirement. The probability of making DRCs also is higher when *CEO-aboveCAP-member* is replaced with *CEO-Annual-pension* (Table 5.10) and *CEO-Total-pension* (Table 5.11). It is estimated that a 1% increase in *CEO-Annual-pension* is associated with 6.8% probability of making DRCs when CEO is closer to retirement compared to 4.7% when CEO is farer to retirement. However, the estimated coefficients are only statistically significant in models without controlling for CFO-characteristics.

Overall, these results indicate that pensions become more important as CEOs approach retirement and CEOs become particularly concerned about the funding in the DB schemes. To improve the funding, CEOs are more likely to make DRCs to ensure the recipience of the full amount of DB pensions once they retire. Moreover, these findings also highlight that CEOs are more concerned about the schemes in which they participate, as consistent with findings from study in Chapter 4.

Table 5.9
Logit regressions of DRCs

This tables reports results from logit regressions on whether CEO DB pension are related to the dependent variable DRCs that equals to 1 if the company made DRCs and 0 otherwise for the sub-sample of CEOs older/younger than 58 years. The CEO pension variable is a dummy variable CEO-aboveCAP-member that takes the value of 1 if CEO is a member of DB pension schemes with accrued pension above the compensation cap and 0 otherwise. Model 1 does not control for CFO characteristics while Model 2 controls for the CFO characteristics. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Standard errors are clustered at the company-level.

Dependent variable: DRCs (dummy)								
	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx
	Model 1				Model 2			
	CEO older than 58 years?							
	Yes		No		Yes		No	
CEO-aboveCAP-member	2.898*		2.025***		2.037		2.322***	
	(0.077)		(0.000)		(0.340)		(0.000)	
ln (CEO-Age)		-2.292*		0.083		-1.340		0.078
		(0.075)		(0.680)		(0.314)		(0.711)
Accounting-background	1.138		1.757***		4.075		2.019***	
	(0.888)		(0.007)		(0.125)		(0.001)	
CFO-aboveCAP					7.815***		0.901	
					(0.005)		(0.576)	
ln (CFO-Age)						-0.163		0.410**
						(0.771)		(0.044)
Single-scheme	44.90***		1.286		32.443***		1.487**	
	(0.000)		(0.185)		(0.000)		(0.040)	
%Equity		-0.007*		-0.005***		-0.006		-0.004***
		(0.051)		(0.001)		(0.176)		(0.002)
Closure-to-FA		-0.035		0.052***		-0.014		0.051***
		(0.186)		(0.000)		(0.567)		(0.000)
Maturity		0.016		0.015		0.022		0.004
		(0.638)		(0.369)		(0.575)		(0.836)
ln (Company-size)		-0.035		-0.031*		0.019		-0.032*
		(0.527)		(0.096)		(0.774)		(0.097)
Leverage		-0.008		0.002		-0.009*		0.002
		(0.126)		(0.318)		(0.071)		(0.249)
ROA		-0.021**		0.006		-0.018*		0.005
		(0.037)		(0.120)		(0.053)		(0.206)
Dividends		0.007		0.007		0.016		0.016*
		(0.710)		(0.339)		(0.318)		(0.055)
Cash		-0.025***		-0.005**		-0.015		-0.002
		(0.008)		(0.041)		(0.153)		(0.453)
FR		0.005		-0.004**		0.006		-0.004*
		(0.276)		(0.040)		(0.120)		(0.052)
Number of obs		166		989		152		961
Wald chi2		55.62		147.59		45.39		155.12
Prob > chi2		0.003		0.000		0.059		0.000
Pseudo R2		0.392		0.171		0.448		0.184
Year effects		Yes		Yes		Yes		Yes
Industry effects		Yes		Yes		Yes		Yes

Table 5.10
Logit regressions of DRCs

This tables reports results from logit regressions on whether CEO DB pension are related to the dependent variable DRCs that equals to 1 if the company made DRCs and 0 otherwise for the sub-sample of CEOs older/younger than 58 years. The CEO pension variable is a is *CEO-Annual-pension* that is defined as the annual size of accrued pension divided by the CEO total wealth (%). Model 1 does not control for CFO characteristics while Model 2 controls for the CFO characteristics. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Standard errors are clustered at the company-level.

Dependent variable: DRCs (dummy)	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx
	Model 1				Model 2			
	CEO older than 58 years?							
	Yes		No		Yes		No	
CEO-Annual-pension		0.068*		0.047***	0.041			0.044***
		(0.090)		(0.000)	(0.250)			(0.000)
ln (CEO-Age)		-2.482		1.176		-2.1461		1.059
		(0.139)		(0.838)		(0.154)		(0.945)
Accounting-background	0.748		1.553**		1.131		1.832***	
	(0.757)		(0.024)		(0.925)		(0.002)	
CFO-Annual-pension					1.368			1.030
					(0.155)			(0.554)
ln (CFO-Age)						-0.066		7.403***
						(0.911)		(0.010)
Single-scheme	70.117***		1.261		79.95***		1.422*	
	(0.000)		(0.208)		(0.000)		(0.062)	
%Equity		-0.005		0.982***		-0.003		0.983***
		(0.270)		(0.000)		(0.527)		(0.002)
Closure-to-FA		-0.070*		1.232***		-0.041		1.220***
		(0.081)		(0.000)		(0.369)		(0.000)
Maturity		0.040		1.055		0.052*		1.020
		(0.152)		(0.420)		(0.062)		(0.782)
ln (Company-size)		-0.089		0.867**		-0.046		0.857**
		(0.101)		(0.048)		(0.259)		(0.039)
Leverage		-0.006		1.005		-0.007		1.005
		(0.311)		(0.503)		(0.235)		(0.456)
ROA		-0.017		1.034*		-0.016		1.028*
		(0.167)		(0.033)		(0.141)		(0.086)
Dividends		-0.004		1.040		-0.003		1.071**
		(0.898)		(0.211)		(0.917)		(0.043)
Cash		-0.020*		0.984		-0.015		0.995
		(0.062)		(0.116)		(0.153)		(0.619)
FR		0.008		0.988		0.008		0.988
		(0.158)		(0.112)		(0.124)		(0.136)
Number of obs		154		1,045		139		1,015
Wald chi2		394.54		142.2		583.9		156.27
Prob > chi2		0.0000		0.0000		0.0000		0.0000
Pseudo R2		0.3994		0.1706		0.4183		0.183
Year effects		Yes		Yes		Yes		Yes
Industry effects		Yes		Yes		Yes		Yes

Table 5.11

Logit regressions of DRCs

This tables reports results from logit regressions on whether CEO DB pension are related to the dependent variable DRCs that equals to 1 if the company made DRCs and 0 otherwise for the sub-sample of CEOs older/younger than 58 years. The CEO pension variable is a is *CEO-Total-pension* that is defined as the annual size of accrued pension divided by the CEO total wealth (%). Model 1 does not control for CFO characteristics while Model 2 controls for the CFO characteristics. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Standard errors are clustered at the company-level.

Dependent variable: DRCs (dummy)	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx
	Model 1				Model 2			
	CEO older than 58 years?							
	Yes		No		Yes		No	
CEO-Total-pension		0.005*		0.003***		0.004		0.003***
		(0.052)		(0.000)		(0.241)		(0.001)
ln (CEO-Age)		0.000*		0.712		0.000		0.727
		(0.071)		(0.677)		(0.288)		(0.708)
Accounting-background	1.438		1.968***		1.365		2.106***	
	(0.661)		(0.000)		(0.727)		(0.000)	
CFO-Total-pension						1.007		1.005
						(0.671)		(0.226)
ln (CFO-Age)						0.367		3.784*
						(0.725)		(0.090)
Single-scheme	44.243***		1.404*		32.551***		1.506**	
	(0.000)		(0.068)		(0.000)		(0.033)	
%Equity		0.976		0.980***	0.986			0.981***
		(0.190)		(0.000)	(0.529)			(0.001)
Closure-to-FA		0.794*		1.233***	0.868			1.242***
		(0.090)		(0.000)	(0.326)			(0.000)
Maturity		1.113		1.010		1.161		0.999
		(0.518)		(0.882)		(0.474)		(0.989)
ln (Company-size)		0.731		0.862**		0.783		0.842**
		(0.219)		(0.042)		(0.338)		(0.025)
Leverage		0.964		1.008		0.963		1.006
		(0.141)		(0.270)		(0.214)		(0.438)
ROA		0.888**		1.034**		0.895*		1.029*
		(0.019)		(0.036)		(0.059)		(0.083)
Dividends		1.024		1.084**		1.007		1.094***
		(0.853)		(0.016)		(0.963)		(0.010)
Cash		0.953		0.998		0.978		0.998
		(0.352)		(0.879)		(0.683)		(0.869)
FR		1.024		0.985***		1.028		0.985**
		(0.294)		(0.040)		(0.282)		(0.050)
Number of obs		161		1,014		140		974
Wald chi2		62.8		151.21		56.81		153.46
Prob > chi2		0.0004		0.0000		0.0044		0.0000
Pseudo R2		0.3669		0.1795		0.3715		0.1853
Year effects		Yes		Yes		Yes		Yes
Industry effects		Yes		Yes		Yes		Yes

5.5. Conclusion

This study questions whether managerial inside-debt incentives are related to the funding policy of deficit. The obtained findings provide evidence that CEO inside debt incentives, but not CFOs, are associated with a higher probability of making DRCs. Also, this study shows that CEOs with short career horizons tend to associate with a higher probability of making DRCs. These findings together suggest that companies tend to make DRCs when their CEOs have inside-debt and that managerial inside debt incentives are important at explaining the funding of DB schemes.

Chapter 6

Corporate structure and funding policy of Defined-Benefit pension schemes

A company with a DB pension scheme is required to make pension contributions to cover the annual costs of DB pensions, e.g., yearly accruals. Pension contributions reduce the cash resources that otherwise may be used for other company activities such as capital investment. Moreover, the company is also exposed to the changes in the market and demographic environments that can significantly increase the rates of pension contributions. The impact on cash will be more significant in company with an underfunded pension scheme because the company needs to make even higher contributions to reduce the deficit. The company, however, may manage pension contributions in several ways. First, the company can defer additional pension contributions, DRCs, or extend the recovery plan that lowers annual DRCs when the pension scheme is underfunded. Second, the company may manage pension assumptions to reduce future service contributions, FSCs, which the company pays to cover the regular annual costs. This study examines whether companies reduce their pension contributions when they are financially constrained.

Companies are less likely to reduce pension contributions under perfect capital markets as the company has no or little interest in accumulating cash. This is because the company's cost of capital is the same whether that capital is raised internally through retained earnings or working capital or externally through the issuance of debt or equity (Modigliani and Miller, 1958). Or, put it differently, the opportunity cost of internal funds is the market interest rate, and the company can borrow and lend at that interest rate in the capital market (Hubbard, 1998).

The interest in accumulating cash (and perhaps motives to reduce pension contributions) may, however, arise when companies are financially restricted in a sense that they cannot easily raise funds in financial markets. Financially constrained companies may find it attractive to reduce some of the company's costs such as cost on pensions when companies are more likely to have less easy access to capital markets or when the cost of the external financing is high (Cooper and Ross, 2002).

However, the relationship between the company's capital structure and pension contributions is complex. On the one hand, a company facing difficulties in raising new capital may particularly be inclined to reduce pension contributions and use this freed-up cash for company's needs such as investments (Kisser, Kiff, and Soto, 2017). On the other hand, pension contributions are tax-deductible, and the company may benefit from making higher pension contributions via tax relief (Davies and de Haan, 2012). Moreover, higher pension contributions will return the pension scheme to full funding more rapidly if there is underfunding. This more likely would lead to the higher credit rating and market value of the company given that market view unfunded pension liabilities as a debt-like for the sponsoring company (Mckillop and Pogue, 2009; Franzoni and Marin, 2006; Rafle, 2004; Jin, Merton and Bodie, 2006). Higher funding also is of great importance to pension scheme members. Given these conflicting motives, existing studies on corporate DB pensions that examine the relationship between pension contributions and capital structure also produce mixed results (e.g., studies for review - Davies and de Haan, 2012; Cocco and Volpin, 2007; Bartram, 2012)[20]

[20] For example, while Davies and de Haan (2012) show that tax- effects are more important to pension contributions decision-making implying that more levered companies tend to make higher pension contributions, Cocco and Volpin (2007) find no direct evidence linking financial constraints to pension scheme financing decisions, perhaps due to presence of endogenous variable. However, estimating the instrumental variables regressions that effectively deals with the endogenous variable, they find that more financially constrained companies with higher proportion of insider-trustees make lower pension contributions. However, Bartram (2018) analysing sample of US companies finds strong evidence that financially distressed companies contribute less to the pension schemes, and these companies also have lower funding levels.

without there being provided reasons why companies are more likely to be inclined to underfund or overfund their pension schemes. Thus, more research is needed to understand whether the capital structure has any impact on the pension funding policy – the issue on which this study aims to provide some evidence.

This study builds on the argument that pension regulation is important for pension funding policy. In particular, pension regulator must be regarded as an important motivator or, instead, demotivator for companies to use pensions as a source of funding. Given that UK pension regulation is less restrictive, this study hypothesizes that UK companies reduce pension contributions when they are financially restricted. Consistent with this hypothesis, this study shows that high-debt companies are associated with lower FSCs and DRCs, suggesting that companies tend to reduce both types of pension contributions when they are financially constrained. This study further documents that while dividends alone positively associated with pension contributions, it has been found that companies with high debt and high dividend payouts are associated with lower pension contributions. These findings suggest that risky companies act in the interests of their shareholders as they to transfer wealth from the pension scheme members to shareholders by increasing dividends and reducing the pension contributions to DB schemes. This harms pension scheme members as it increases the likelihood of the pension scheme default.

This study extends the stream of research on corporate DB pension schemes and contributes to the literature in several ways. First of all, this study concentrates on UK companies reflecting UK- specific regulatory framework for companies with corporate DB pension schemes. Whereas Davies and de Haan (2012) show that tax effects play a more critical role, this study produces contrasting results which are more likely to be driven by the differences in pension regulation. Therefore, this study adds new insights on the pension contributions-capital structure relationship reflecting the unique regulatory background for the British companies with DB pension arrangements. However, the findings of this study can also be applied to other countries with lighter pension regulation, such as the US. As evidence of applicability, the results of this study are consistent with those obtained in Bartram (2018) who, analysing the sample of US companies, also finds that high debt companies tend to reduce pension contributions. Moreover, findings can be used by countries which consider relaxing pension regulation to assess the implications for pension scheme members.

Second, this is the first study that distinguishes between two types of pension contributions. By examining regular contributions and DRCs separately, this study allows establishing whether companies manage regular contributions, DRCs or both. To know whether or not companies manage regular contributions, DRCs or both is important because the companies are not expected to make pension contributions when they lack the cash or face borrowing restrictions except for DRCs which can be set up that best suit their financial needs. This study’s findings reveal that companies tend to manage both regular contributions and DRCs. This can harm the pension scheme members as it not only increases the likelihood of default but also lowers the amount of pension assets. First, making lower regular contributions would increase the deficit in DB schemes. This is because the reduction in regular contributions is driven by the company’s need for a higher cash and not by the lower cost of DB pensions. Second, DRCs may be less effective at reducing the deficit if the company also reduces regular contributions. This can explain why the deficit in DB schemes in some companies grows despite having DRCs (e.g., Carillion, BHS). Therefore, these findings reveal important regulatory implications for the management of DB schemes, which might also be of interests to pension regulators who may consider improving the existing pension regulation. To improve the current measures, regulators may consider more transparent reporting practices to prevent pension assumptions management and introduce the deadline for eliminating the deficit. These measures may help to improve the regulation regarding how companies deal with the pension deficit and enchase the security of the members' benefits. Moreover, as a primitive measure, the pension regulators may pay more attention to companies whose schemes funding worsens, since this may indicate that some of the pension assumptions might be violated. The stronger attention should be paid to companies which make DRCs and whose schemes funding worsens and/or does not improve since there could be a substitution effect through pension assumptions manipulation. These steps may prevent the pension scheme to restore the funding levels.

This study also contributes to the literature (Bunn, Mizen, and Smietanka, 2018; Liu and Tonks, 2012) by documenting the impact of dividends on pension contributions showing that shareholders are expected to reduce the pension deficit. However, more risky companies tend to reduce pension contributions to pay dividends. Therefore, this study contributes to the literature by showing how financial constraints distort pension financing decisions and how financial constraints affect the dividends-funding policy relationship.

Lastly, this study contributes by utilising the most recent time-series cross-sectional data covering FTSE 350 companies over 2004-2015. This data starts from 2004 – the year when Pension Act 2004 was introduced, and previous funding requirements had been replaced by the new “scheme-specific” funding requirements. This would imply that empirical findings of this study reflect the company’s behaviour towards their pension schemes imposed by the current regulation. Therefore, this study findings may be used by regulators to respond to the problem of under-contributing in times when company face borrowing restrictions for future deficit prevention and better management of the schemes.

The structure of the chapter is following: Section 6.2 develops the hypotheses; Section 6.3 discusses the research design; Section 6.4 presents the findings and Section 6.5 concludes.

6.2. Hypotheses development

High debt companies are more likely to have less easy access to capital markets or incur higher debt servicing costs due to escalated risk of existing outstanding debt (Acharya et al., 2007; Dhaliwal et al., 2006). These constraints may result in companies not generating sufficient cash to cover their cash requirements for sustaining and growing their business. As a result, they may become more hesitant about the expenditure to save more cash for the company's needs. Prior studies show that companies with high debt issuance tend to save cash out of cash to respond to the increase in cash flow risk (Harris and Roark, 2019; Opler, Pinkowitz, Stulz, and Williamson, 1999; Ginglinger and Saddour, 2012; Bates, Kahle, and Stulz, 2009) to be able to meet their operating needs (Denis and Mckeon, 2012).

The presence of high debt in the capital structure can also affect the pension funding decisions as DB pensions take away significant cash from the company. Cooper and Ross, (2002) argue that when the company is financially constrained, it may find it attractive to reduce pension contributions. For example, the company may borrow funds from the pension scheme members by making lower pension contributions to DB schemes without incurring significant cost. It might then repay if the situation improves or share the cost with the pension scheme members if the company bankrupts. Therefore, given that high debt may either limit the company to raise funds or raise new funds at the lower cost that may affect the company's cash, it is expected that pension contributions to be negatively associated to the level of debt in a company capital structure. Prior studies on corporate DB pension schemes support this hypothesis by documenting that companies apply more aggressive pension assumptions to reduce the pension contributions when they are financially constrained, lack of cash or when they generate lower profit (Gold, 2003; Bergstresser, Desai, and Rauh, 2006; Billings, O'brien, and Woods, 2016; Braswell, Chang, and Hsieh, 2017; Addoum, Binsbergen, and Brandt, 2010).

However, it is worth noting that this study predicts a negative relationship between pension contributions and debt that contradicts with the findings of Davies and de Haan (2012). This is due to the less restrictive regulation that more likely to induce companies to borrow from schemes rather than overfund and to benefit from higher tax relief. For example, In the Netherlands, the pension regulator imposes to submit a short-term recovery plan for pension schemes in deficit outlining how it expects to increase the funding ratio above the minimum (105%) required level within three years (de Haan, 2015). Such strict rules may give companies fewer incentives to reduce the pension contributions as borrowing today from the pension scheme members the company is obliged to pay back in the next two years which can significantly constrain the cash holdings. Contrary to the Netherlands, companies operated under UK law are given considerable leeway, and such difference in regulation may induce British companies to behave very differently compared to Dutch companies concerning their pension schemes. There is no specific deadline for eliminating the deficit and level and timing of additional contributions is entirely upon the company. Such regulatory "freedom" may underlie the incentives to delay making DRCs. Moreover, such regulatory flexibilities may also create incentives to reduce FSCs as the company can effectively spread the current deficit, which will occur as a result of under-contributing into future periods. Therefore, it is expected that British companies with high debt are more likely to underfund their DB schemes.

Hypothesis 1: Companies with high debt in their corporate structure are negatively associated with the pension contributions

Webb (2007) argues that companies may be more inclined to pay out cash to equity holders and to either underinvest (due to a debt-like overhang of pension liabilities) or invest in risky projects (due to risk-shifting). If so, companies may have even stronger incentives to pay dividends when the company is more financially distressed, since this results in a wealth transfer from debt to equity holders. Studies show that financially distressed companies have higher dividend yield and a higher payout ratio than for non-financially distressed companies (Cohen and Yagil, 2009). Therefore, it is expected that companies with high debt and high dividends are associated with lower pension contributions.

Hypothesis 2: Companies with high debt and high dividends are associated with lower pension contributions

6.3 Research design

6.3.1. Sample

This study focuses on the companies in the FTSE 350 index with DB pension arrangements. The main sample used in the analysis consists of non-financial companies. The reason for excluding financial companies from the sample is due to the excessive leverage that is normal for the financial institutions but does not have the same meaning for non-financial companies, where high leverage more likely indicates distress (Fama and French, 1992). However, financial companies are included for robustness check. The main sample covers 145 non-financial companies with DB pension arrangements over 2004-2015 period resulting in 1,402 year-observations. The full sample covers 171 companies over 2004-2015 period resulting in 1,671 year-observations in total.

6.3.2. Variables construction

Dependent variables

This study uses three dependent variables: *TOTAL* pension contributions, *REGULAR* (future service) pension contributions and deficit-repair contributions *DRCs*. *TOTAL*-contributions consist of both regular pension contributions and additional contributions, *DRCs*, to all DB pension schemes for a company-year, scaled by the pension liabilities. *REGULAR*-contributions consist of regular contributions only (exclude *DRCs*) to all DB pension schemes for a company-year, scaled by the pension liabilities. *DRCs* include additional contributions made towards deficit reduction to all DB pension schemes, scaled by the pension liabilities.

The data on the contribution policy of DB schemes is collected from annual reports.

Financial constraint

The financial constraint is the level of debt in the company's corporate structure. This study uses two measures of financial constraints which were used in previous studies examining the contribution policy of DB schemes. In particular, this study follows the previous study of Bartram (2018) in using a measure of financial constraint as a debt to market capitalisation (*Debt-to-MC*) and the study of Davies and de Haan (2012) in using a measure of financial constraint as debt to total assets (*Debt-to-TA*). Higher ratio means that the company still has a relatively high amount of debt to be paid out that may limit the company's access to capital markets or increase the cost of capital for the company. As predicted, this may motivate companies to reduce pension contributions implying the negative relationship between *debt* and the pension contributions.

The data on debt, total assets and market capitalisation have been obtained from DataStream.

Other variables

Similar to previous studies in Chapters 4-5, this study also controls for the effects of the company-specific factors on the contribution policy of DB schemes. In particular, it controls for the size of the company, profitability, cash and dividends. Larger companies are likely to have more resources and higher leverage capability (Wilden, Gudergan, Nielsen, and Lings, 2013). This may suggest that larger companies may afford to pay higher pension contributions both regular contributions to cover the ongoing cost and additional contributions to reduce the deficit. Therefore, it is expected that the size of the company positively associated with pension contributions. This conjecture is supported by the prior studies (Davies and de Haan, 2012; Bartram, 2018) who find the positive relationship between the size of the company and the pension contributions and funding of DB schemes.

How much to contribute to a DB scheme also depends upon whether the company generates enough profit because the company is more likely to make lower pension contributions when the company's profitability falls (Cooper and Ross, 2001). Therefore, it is expected that company profitability, as measured by the returns on company's assets (*ROA*), positively associated with pension contributions. Apart from *ROA*, it is important to control for the company's cash because the company is more likely to make lower pension contributions when it has lower cash even when the company is more profitable. Therefore, it is expected that cash defined the company's cash to total assets *(Cash)* positively associated with pension contributions. While studies in Chapters 4-5 find no evidence that profitability and cash matter for funding and funding policy of deficit of DB schemes, previous studies show that companies manage pension assumptions which affect the size of pension contributions when the company faces a decline in earnings (Godwin et al., 1996), when economic downturn affects profitability (Braswell, Chang, and Hsieh, 2017) and when they have insufficient cash holdings and generate lower profit (Bartram, 2018). Davies and de Haan (2012) investigating pension contributions also find that more profitable companies pay higher pension contributions into their schemes. As previously discussed, companies are more likely to pay higher pension contributions when they pay out more in dividends. However, it is expected that companies pay higher *DRCs*, but not *REGULAR*-contributions, when they make higher dividends. Therefore, it is expected that *Dividends* positively associated with *DRCs*.

This study also controls for pension scheme characteristics. In particular, it controls for the number of years of DB scheme closure to future accruals (*Closure-to-FA*), the maturity of the scheme *(Maturity)*, the proportion of assets invested in equities *%Equity* and whether company sponsors only one DB scheme (*Single-scheme*). It is expected that *Closure-to-FA* negatively associated with the *REGULAR*-contributions as the ongoing cost of DB pensions reduces when the company closes its scheme. As previously discussed, companies can reduce the size of pension contributions by increasing the share of assets invested in equities. Therefore, it is expected that %*Equity* negatively associated with pension contributions. It is also expected that companies with single schemes pay lower pension contributions due to less operational costs and more effective investment strategies (DWP White Paper, 2018).

Also, this study controls for funding levels of DB schemes and the performance of the pension assets. Funding of DB schemes is defined as the ratio of pension assets to pension liabilities, *%FR*, similar to studies in Chapters 4-5. Higher funding means that the DB scheme is better funded, and the company may consider reducing the pension contributions to avoid the scheme overfunding. The higher funding may also reflect the fall in pension liabilities or increase in the market performance of pension assets (due to the changes in economic and/or demographic factors). Therefore, higher funding may suggest that the cost of DB schemes is lowered. As a result, companies more likely to reduce the size of pension contributions needed from the company. Therefore, it is expected to observe a negative relationship between *%FR* and the *REGULAR*-contributions. However, it is expected to observe a positive relationship between *%FR* and *DRCs* because *DRCs* are made to improve the funding. While there is no research that examines the different types of pension contributions, prior studies find that funding levels of DB schemes negatively related to (total) pension contributions (Davies and de Haan, 2012; Jones, 2014; Bartram, 2017).

With respect to the performance of pension assets, it is expected that companies that generate higher returns than expected are associated with lower pension contributions. High returns on pension assets allow the company to re-negotiate lower regular pension contributions as well as lower or no DRCs. Therefore, it is expected to observe a negative relationship between *Scheme-returns* and pension contributions.

Table 6.1 reports the variables names, their definitions and the data sources and Table 6.2 reports the pair-wise correlation. The correlation matrix in Table 6.2 does not reveal a high correlation between variables except for *Debt-to-MC* and *Debt-to-TA,* which is not an issue because these variables are used interchangeably. The results from the VIF also does not detect multicollinearity. The estimated parameters from VIF for each specification are reported in the Appendix.

Table 6.1

Variables definitions and data sources

Variable	Definition	Data source
TOTAL-contributions	pension contributions made to cover the ongoing cost of pensions plus contributions towards deficit reduction in period *t* scaled by the pension liabilities in period *t, %*	companies' annual reports
REGULAR-contributions	pension contributions made to cover the ongoing cost of pensions in period *t* scaled by the pension liabilities in period *t, %*	companies' annual reports
DRCs	additional pension contributions towards deficit reduction in period *t* scaled by the pension liabilities in period *t, %*	companies' annual reports
Financial constraint		
Debt-to-MC	total liabilities in period *t* scaled by the market capitalisation in period *t, %*	DataStream
Debt-to-TA	total liabilities in period *t* scaled by the total assets in period *t, %*	DataStream
Company characteristics		
Ln (Company-size)	log of the company's total assets in period *t*	DataStream
Profitability	Operating income in period *t* to market capitalisation in period *t, %*	DataStream
Cash	company's cash and cash equivalents in period *t* to total assets in period *t, %*	DataStream
Dividends	dividends in period *t* to market capitalisation in period *t, %*	DataStream
Pension scheme characteristics		
Closure-to-FA	number of fiscal years since the scheme closure to future accruals	companies' annual reports
Maturity	pension liabilities paid out in period *t* to total pension liabilities in period *t, %*	DataStream/companies' annual reports
%Equity	share of pension assets invested in equities, %	DataStream/companies' annual reports
Single-scheme	indicator variable that takes the value of 1 if company has only one DB scheme and 0 otherwise	companies' annual reports
%FR	pension assets in period t to pension liabilities in period *t*, %	DataStream/companies' annual reports
Scheme-returns	realized returns in period *t* minus the predicted returns in period *t-1* scaled by the pension assets in period *t-1*, %	DataStream, companies' annual reports

Table 6.2

Pair-wise correlation. Correlations significant at the 5% level or better are denoted with *.

	TOTAL-contributions	REGULAR-contributions	DRCs	Debt-to-MC	Debt-to-TA	Ln (Company-size)	ROA	Dividends	Cash	FR	Equity	Closure-to-FA	Maturity	Single-scheme	Scheme-returns
TOTAL-contributions	1														
REGULAR-contributions	0.6685*	1													
DRCs	0.6007*	-0.1608*	1												
Debt-to-MC	-0.0413	-0.0460*	-0.015	1											
Debt-to-TA	-0.0675*	-0.0327	-0.0511*	0.6583*	1										
Ln (Company-size)	-0.0431	-0.0875*	0.0507*	0.5454*	0.3713*	1									
ROA	0.0774*	0.0802*	0.0267	-0.5803*	-0.2445*	-0.2705*	1								
Dividends	0.0731*	-0.0047	0.0917*	0.1823*	-0.0639*	0.0101	-0.0662*	1							
Cash	0.0578*	-0.0531*	0.1283*	0.0941*	-0.1326*	-0.0623*	0.0233	0.7826*	1						
FR\	-0.0985*	0.0639*	-0.2342*	0.0112	-0.0247	0.0691*	-0.0608*	-0.0052	-0.0079	1					
Equity	0.2037*	0.0187	0.2829*	-0.1201*	-0.0359	-0.2642*	0.1154*	-0.0408	-0.0112	-0.3280*	1				
Closure-to-FA	-0.1108*	0.0596*	-0.2352*	-0.0516*	-0.1064*	-0.1822*	0.0153	-0.0263	-0.0149	0.1012*	-0.0659*	1			
Maturity	-0.0675*	-0.0753*	-0.0358	0.0903*	0.0401	0.1400*	-0.0690*	-0.0076	-0.0366	0.0444*	-0.2489*	-0.0199	1		
Single-scheme	0.0465*	0.1037*	-0.0625*	-0.0915*	-0.1596*	-0.2232*	0.0514*	-0.0488*	-0.0626*	0.1493*	0.0529*	0.1816*	-0.0827*	1	
Scheme-returns	-0.0295	0.042	-0.0848*	-0.1288*	-0.0435	-0.0051	0.1141*	-0.0526*	0.0431	0.0099	0.017	0.0606*	-0.1643*	0.0143	1

6.4. Results

6.4.1. Descriptive statistics

Few variables are found to have some outliers. In particular, there are outliers in the *TOTAL*-, *REGULAR*- contributions and *DRCs* (Graph 6.1). While it is expected to observe some variation in *DRCs* because companies' decisions to pay lower/higher DRCs more likely depend on the companies' circumstances, some variation is also observed in *REGULAR*-contributions. The variation in *REGULAR*-contributions more likely to be due to the additional costs may arise as a result of the specific activities. For example, additional costs can be associated with the equalisation of the scheme obligations, acquisition of the company with DB scheme/s, the merger of pension schemes, unfunded pension obligations, indexation of the pension liabilities, additional consultation costs, enhanced transfer offers. These one-off costs are additional to the company that increase the overall costs of DB pensions. To ensure that the results are not influenced by these outliers, *TOTAL*-, *REGULAR*- contributions and *DRCs* are winsorized at 98%. This study also winsorizes *Debt-to-TA, Profitability, Cash, Dividends* and *Scheme-returns* at 2% and 98% levels to minimise the influence of outliers in these variables.

Table 6.3 reports descriptive statistics such as minimum (*Min*), mean (*Mean*), median (*Median*) and maximum (*Max*) values and standard deviation (*SD*) of the variables used in the study both for the sample of all companies (*All companies*) and the sample of non-financial companies (*Non-financial companies).* According to the statistics reported for the sample of all companies, the average value of *TOTAL*-contributions is 3.875%, with a standard deviation of 2.8% and the minimum and the maximum value of 0% and 13.463%. The average *REGULAR*-contributions is 2.313%, with a standard deviation of 1.891% and the minimum and the maximum value of 0% and 8.101%. The average value of *DRCs* is 1.488%, with a standard deviation of 2.167% and the minimum and the maximum value of 0 and 9.358%. The average value of *Debt-to-MC* is 41.493%, with a standard deviation of 18.354% and the minimum and the maximum value of 7.671% and 96.751%. The average value of *Debt-to-TA* is estimated at 61.441%, with a standard deviation of 19.089% and the minimum and the maximum value of 19.532% and 104.908%. DB schemes, on average, generate returns 1.751% of the pension assets, with a standard deviation of 9.759% and the minimum and the maximum value of -26.741% and 21.815%. Other companies and pension-schemes characteristics have been discussed in previous Chapters.

According to the statistics reported for the sample of non-financial companies, removal of the financial companies from the sample does not significantly affect the statistics on *TOTAL-*, *REGULAR-* contributions and *DRCs*. However, financial companies appear to have higher debt as the average *Debt-to-MC* and *Debt-to-TA* is lower in the sample that excludes the financial companies.

Table 6.3

Descriptive statistics

Variables	Min	Mean	Median	Max	SD	N of observations
Non-financial companies						
TOTAL-contributions, %	0.000	3.875	3.198	13.463	2.800	1960
REGULAR-contributions, %	0.000	2.313	1.991	8.101	1.891	1960
DRCs, %	0.000	1.488	0.382	9.358	2.167	1960
Debt-to-MC, %	7.671	41.493	40.243	96.751	18.354	1729
Debt-to-TA, %	19.532	61.441	62.054	104.908	19.089	1746
Ln (Company-size), £ mil	4.331	7.706	7.536	12.344	1.415	1758
ROA, %	-84.040	8.568	7.715	100.830	9.049	1732
Dividends, %	0.000	4.408	2.834	210.612	13.459	1722
Cash, %	0.000	10.516	6.257	632.046	31.741	1528
FR, %	14.342	87.185	87.846	136.658	13.824	1960
Equity, %	0.000	48.576	49.000	100.000	19.757	1854
Closure-to-FA, years	0.000	0.734	0.000	15.000	1.984	1920
Maturity, %	0.000	3.747	3.563	36.971	2.144	1841
Single-scheme, 0-1	0.000	0.275	0.000	1.000	0.446	1894
Scheme-returns, %	-26.741	1.751	2.847	21.815	9.759	1667

All-companies

Variables	Min	Mean	Median	Max	SD	N of observations
TOTAL-contributions, %	0.000	3.879	3.169	13.463	2.857	2276
REGULAR-contributions, %	0.000	2.317	1.987	8.101	1.894	2276
DRCs, %	0.000	1.479	0.301	9.358	2.195	2276
Debt-to-MC, %	7.671	45.445	42.424	96.751	22.159	1999
Debt-to-TA, %	19.532	63.790	64.038	104.908	20.383	2016
Ln (Company-size), £ mil	3.615	7.983	7.624	14.689	1.822	2033
ROA, %	-84.040	7.900	7.025	100.830	8.928	1994
Dividends, %	0.000	4.392	2.918	210.612	12.585	1992
Cash, %	0.000	10.482	6.210	632.046	31.493	1556
FR, %	14.342	88.137	88.566	160.540	14.541	2276
Equity, %	0.000	47.978	48.130	100.000	20.126	2137
Closure-to-FA, years	0.000	0.879	0.000	15.000	2.205	2237
Maturity, %	0.000	3.713	3.488	36.971	2.158	2136
Single-scheme, 0-1	0.000	0.282	0.000	1.000	0.450	2211
Scheme-returns, %	-26.741	1.811	2.890	21.815	9.673	1927

6.4.2. Empirical results

At the empirical stage of the analysis, this study employs a fixed effect (FE) panel regression estimation method with year effects and clustered standard errors. FE panel regression controls for unobserved company and time effects and produces standard errors which are robust to heteroscedasticity and autocorrelation. Because panels with much more cross-sections than periods may also suffer from spatial correlation, Hoechle (2007) estimation method with Driscoll-Kraay standard errors is used. Driscoll-Kraay provides standard errors which are robust to heteroscedasticity, autocorrelation, and spatial correlation. In addition to these models, the FGLS is also used for the estimation. This method can achieve effective estimation results (Wooldridge, 2002) and could be used when time-variation in the data is lower than the cross-sectional variation (Davies and de Haan, 2012). This study uses FGLS with robust to heteroskedasticity standard errors and adjustment for panel- specific first-order autoregression in the error.

Debt and the contribution policy of DB schemes (H1)

Results from FE, Hoechle and FGLS regressions are reported in Tables 6.4 – 6.5: Table 6.4 reports results examining the relationship between *Debt-to-MC* and the pension contributions and Table 6.5 reports results examining the relationship between *Debt-to-TA* and the pension contributions. Each regression includes (unreported) year dummies to control for any unobserved time- related effects. FGLS regressions also include (unreported) industry effects to control unobserved industry- related effects. Specifications from (1) – (3) examine *TOTAL*-contributions and specifications from (4) – (6) and (7) – (9) examine *REGULAR*-contributions and *DRCs*, respectively. Estimates from VIF suggest that multicollinearity is not an issue as the VIF does not exceed the critical value of 10 (Belsley, Kuh, and Welsch, 1980). Estimates from VIF for each model specification are reported in the Appendix.

Hypothesis 1 predicts that high-debt companies reduce their pension contributions to DB schemes. The results from the FE, Hoechle and FGLS estimators provide strong support in favour of this hypothesis. In particular, the estimated coefficients on *Debt-to-MC* in Models (1) – (3) are all negative and statistically significant at 1% levels. The negative relationship implies that companies with high debt tend to reduce their pension contributions to DB schemes. It is estimated that an increase in one standard deviation in *Debt-to-MC* results, on average, in a decrease, depending on the estimator, of 0.155 - 0.246 standard deviations in *TOTAL*-contributions. The negative relationship is also observed between *Debt-to-MC* and *REGULAR*-contributions (Models (4) – (6)) and between *Debt-to-MC* and *DRCs* (Models (7) – (9)): the estimated coefficients on *Debt-to-MC* are all negative and statistically significant at the conventional levels. These findings indicate that companies tend to manage both *REGULAR*-contributions and *DRCs* when they have more debt. It is estimated that an increase in one standard deviation in *Debt-to-MC* results, on average, in a decrease, depending on the estimator, of 0.125 - 0.129 standard deviations in *REGULAR*-contributions and 0.117 – 0.209 standard deviations in *DRCs.* It is worth noting that *Debt-to-MC* is negative and statistically significant in all models - models that distinct within effect only (FE) and models that distinct within and between effects (FGLS). Therefore, these results provide fairly support for the stated hypothesis.

The results reported in Table 6.5 that examines the relationship between *Debt-to-TA* and the pension contributions provide further support for the stated hypothesis. The coefficients on *Debt-to-TA* are negative and statistically significant in all model specifications. It is estimated that an increase in one standard deviation in *Debt-to-TA* results, on average, in a decrease, depending on the estimator, of 0.115 - 0.133 standard deviations in *TOTAL*-contributions, 0.078 – 0.060 standard deviations in *REGULAR*-contributions and 0.065 - 0.133 standard deviations in *DRCs.* Comparing the magnitude of the estimated coefficients, it appears that the pension contributions are more sensitive to the debt relative to the market capitalisation. Overall, these results imply that high-debt companies tend to reduce the expenditure on pensions to have more cash for the company's needs, as consistent with the stated hypothesis.

The results also suggest that larger companies tend to make higher *TOTAL*- *REGULAR*-pension contributions and *DRCs*. These results are consistent with the prediction that larger companies can afford to make higher contributions as they have more financial resources and higher leverage capability. The *ROA* and *Cash* are found to be important for *REGULAR*-contributions only, suggesting that more profitable companies and companies with higher cash tend to make higher contributions to cover the ongoing cost of DB pensions. However, these factors are less of importance for *DRCs*.

As consistent with previous studies in Chapter 4-5, it is found that companies which pay higher dividends are associated with higher DRCs. This finding implies that shareholders in a company with a pension deficit should expect to cover the deficit. It is estimated that an increase in one standard deviation in *Dividend*s increases, depending on the estimator, 0.075 - 0.090 standard deviations in *DRCs:* the estimated coefficients on *Dividends* are statistically significant at 1% levels in DRCs regressions. Moreover, combining the evidence from previous Chapters, it appears that *Dividends* worked well at reducing the deficit as *Dividends* are also found to be positively associated with the funding of DB schemes.

As consistent with the prediction, there is evidence that *Closure-to-FA* negatively associated with *REGULAR*-contributions, but the coefficients on *Closure-to-FA* are only significant in FGLS. However, it also has been found that *Closure-to-FA* positively associated with *DRCs*, as consistent with the findings in Chapter 5. The positive relationship suggests that companies pay higher DRCs after the company closes its scheme. As previously argued, in closed schemes there could be a shift of power more towards the scheme trustees whose function will be to continue to look after the interests of all scheme members to justify the reasons of closure the scheme. As a result, trustees may pressurise companies to make *DRCs* to reduce the deficit. However, results from Chapter 4 suggest that *Closure-to-FA* negatively associated with the funding suggesting that *DRCs* might not be effective at reducing the deficit.

It also has been found that more mature schemes pay higher *REGULAR*-contributions. Moreover, *%Equity* is found to be positively associated with *REGULAR*-contributions but negatively with *DRCs*. These results suggest that companies increase the share of pension assets into equities to pay lower DRCs. The analysis also reveals that companies with single-schemes pay lower *REGULAR*-contributions due to lower operational costs, as consistent with the prediction. Moreover, combining the evidence from the previous Chapters, it appears that companies significantly benefit from having only one DB schemes - companies with single-schemes pay lower *REGULAR*-contributions and also show have funding levels.

Consistent with the prediction, companies tend to reduce *REGULAR*-contributions when the funding improves. There is some evidence that *%FR* positively associated with *DRCs*, but the estimated coefficients are only significant in FE regression with clustered standard errors (Model (7)).

Estimates from regressions reported in Tables 5.5 are similar in direction and significance to those discussed above.

Table 6.4
Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs*.
All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		Total-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Debt-to-MC	B	-0.0336***	-0.0336***	-0.0212***	-0.0109*	-0.0109**	-0.0113***	-0.0211**	-0.0211**	-0.0118***
	β	-0.2464***	-0.2464***	-0.1554***	-0.1247*	-0.1247**	-0.1294***	-0.2093**	-0.2093**	-0.1169***
	p-value	(0.0010)	(0.0040)	(0.0000)	(0.0640)	(0.0140)	(0.0000)	(0.0230)	(0.0130)	(0.0000)
Ln (Company-size)	B	0.9247**	0.9247*	-0.0117	0.4716**	0.4716***	0.1910***	0.4579*	0.4579	-0.1163**
	β	0.5570**	0.5570*	-0.0070	0.4432**	0.4432***	0.1795***	0.3729*	0.3729	-0.0947**
	p-value	(0.0270)	(0.0530)	(0.8280)	(0.0420)	(0.0000)	(0.0000)	(0.0940)	(0.2320)	(0.0120)
Profitability	B	0.0199	0.0199	0.0146*	0.0165*	0.0165**	0.0070*	0.0066	0.0066	0.0066
	β	0.0435	0.0435	0.0319*	0.0561*	0.0561**	0.0240*	0.0194	0.0194	0.0195
	p-value	(0.3520)	(0.2380)	(0.0580)	(0.0840)	(0.0430)	(0.0850)	(0.7230)	(0.5530)	(0.2450)
Dividends	B	0.0363*	0.0363***	0.0216**	-0.0057	-0.0057	-0.0036	0.0391***	0.0391***	0.0328***
	β	0.0616*	0.0616***	0.0366**	-0.0150	-0.0150	-0.0095	0.0898***	0.0898***	0.0754***
	p-value	(0.0780)	(0.0040)	(0.0270)	(0.6410)	(0.1550)	(0.3040)	0.0000	(0.0090)	0.0000
Cash	B	0.0261	0.0261	0.0150*	0.0303***	0.0303**	0.0155***	-0.0094	-0.0094	-0.0072
	β	0.0553	0.0553	0.0317*	0.1001***	0.1001**	0.0514***	-0.0270	-0.0270	-0.0207
	p-value	(0.1360)	(0.1110)	(0.0730)	(0.0060)	(0.0130)	(0.0000)	(0.5030)	(0.3460)	(0.1790)
Closure-to-FA	B	0.0732	0.0732*	-0.0622*	0.0240	0.0240	-0.1253***	0.0401	0.0401*	0.0079
	β	0.0531	0.0531*	-0.0451*	0.0272	0.0272	-0.1418***	0.0393	0.0393*	0.0077
	p-value	(0.3910)	(0.0560)	(0.0890)	(0.6270)	(0.3600)	0.0000	(0.5350)	(0.0770)	(0.7650)
Scheme-returns	B	-0.0053	-0.0053	-0.0072**	-0.0054	-0.0054*	-0.0041**	0.0024	0.0024	-0.0016
	β	-0.0168	-0.0168	-0.0228**	-0.0269	-0.0269*	-0.0204**	0.0104	0.0104	-0.0069
	p-value	(0.5280)	(0.5430)	(0.0430)	(0.2370)	(0.0920)	(0.0210)	(0.6740)	(0.6760)	(0.4630)
Maturity	B	0.1687*	0.1687**	-0.0539	0.1329**	0.1329**	0.0006	-0.0229	-0.0229	-0.0358*
	β	0.0827*	0.0827**	-0.0264	0.1017**	0.1017**	0.0004	-0.0152	-0.0152	-0.0237*
	p-value	(0.0620)	(0.0400)	(0.1180)	(0.0220)	(0.0110)	(0.9770)	(0.7350)	(0.7220)	(0.0610)
%Equity	B	-0.0168	-0.0168*	0.0029	0.0026	0.0026*	0.0096***	-0.0164*	-0.0164*	-0.0042**
	β	-0.1108	-0.1108*	0.0193	0.0266	0.0266*	0.0990***	-0.1465*	-0.1465*	-0.0372**
	p-value	(0.1380)	(0.0530)	(0.3440)	(0.5870)	(0.0750)	0.0000	(0.0710)	(0.0560)	(0.0430)
Single-scheme	B	-0.7312	-0.7312	0.1845	-0.5904**	-0.5904**	-0.4334***	-0.0056	-0.0056	0.5565***
	β	-0.2396	-0.2396	0.0605	-0.3019**	-0.3019**	-0.2216***	-0.0025	-0.0025	0.2466***
	p-value	(0.2270)	(0.3550)	(0.2970)	(0.0260)	(0.0150)	0.0000	(0.9910)	(0.9930)	0.0000
%FR	B	0.0167	0.0167	-0.0101**	-0.0107*	-0.0107*	-0.0089***	0.0266**	0.0266	0.0005
	β	0.0777	0.0777	-0.0470**	-0.0777*	-0.0777*	-0.0649***	0.1674**	0.1674	0.0034
	p-value	(0.1960)	(0.2810)	(0.0210)	(0.0890)	(0.0840)	0.0000	(0.0280)	(0.1280)	(0.8640)
_cons	B	-3.1245	-3.1245	5.1042***	-0.6295	-0.6295	1.5919***	-2.5618	-2.5618	2.7679***
	p-value	(0.4010)	(0.4360)	0.0000	(0.7530)	(0.5200)	0.0000	(0.3040)	(0.4930)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
Number of companies		146	146	145	146	146	145	146	146	145
F-stat		7.68	631.26		8.42	1183.28		3.06	1246.97	
Wald chi				692.43			1574.24			223.45
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Within		0.1354	0.1354		0.2174	0.2174		0.0564	0.0564	
Between		0.0024			0.085			0.0198		
Overall		0.0167			0.1317			0.0003		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.5

Regressions of *TOTAL-*, *REGULAR-* contributions and *DRCs.*

All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		Total-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-TA	B	-0.0200*	-0.0200***	-0.0173***	-0.0057	-0.0057*	-0.0075***	-0.0148*	-0.0148***	-0.0073***
	β	-0.1326*	-0.1326***	-0.1145***	-0.0595	-0.0595*	-0.0780***	-0.1329*	-0.1329***	-0.0654***
	p-value	(0.0710)	(0.0080)	(0.0000)	(0.3020)	(0.0800)	(0.0000)	(0.0980)	(0.0080)	(0.0090)
Ln (Company-size)	B	0.7229*	0.7229*	-0.0658	0.4061*	0.4061***	0.1552***	0.3312	0.3312	-0.1488***
	β	0.4354*	0.4354*	-0.0397	0.3817*	0.3817***	0.1459***	0.2697	0.2697	-0.1212***
	p-value	(0.0790)	(0.0740)	(0.2130)	(0.0870)	(0.0020)	(0.0000)	(0.2090)	(0.3250)	(0.0010)
Profitability	B	-0.0014	-0.0014	0.0016	0.0093	0.0093	-0.0020	-0.0060	-0.0060	-0.0032
	β	-0.0030	-0.0030	0.0034	0.0317	0.0317	-0.0069	-0.0177	-0.0177	-0.0096
	p-value	(0.9430)	(0.9500)	(0.8290)	(0.2290)	(0.3250)	(0.5740)	(0.6930)	(0.6960)	(0.5070)
Dividends	B	0.0276	0.0276***	0.0166*	-0.0086	-0.0086*	-0.0054	0.0340***	0.0340***	0.0295***
	β	0.0469	0.0469***	0.0282*	-0.0227	-0.0227*	-0.0144	0.0780***	0.0780***	0.0677***
	p-value	(0.1390)	(0.0020)	(0.0760)	(0.4560)	(0.0700)	(0.1140)	(0.0000)	(0.0050)	(0.0000)
Cash	B	0.0263	0.0263	0.0183**	0.0304***	0.0304**	0.0163***	-0.0096	-0.0096	-0.0064
	β	0.0556	0.0556	0.0387**	0.1005***	0.1005**	0.0540***	-0.0275	-0.0275	-0.0184
	p-value	(0.1370)	(0.1200)	(0.0310)	(0.0050)	(0.0150)	(0.0000)	(0.4970)	(0.3540)	(0.2300)
Closure-to-FA	B	0.0836	0.0836**	-0.0740**	0.0275	0.0275	-0.1419***	0.0463	0.0463**	0.0106
	β	0.0606	0.0606**	-0.0537**	0.0311	0.0311	-0.1606***	0.0454	0.0454**	0.0104
	p-value	(0.3260)	(0.0420)	(0.0450)	(0.5740)	(0.3240)	(0.0000)	(0.4740)	(0.0170)	(0.6850)
Scheme-returns	B	-0.0035	-0.0035	-0.0072	-0.0049	-0.0049	-0.0038**	0.0035	0.0035	-0.0014
	β	-0.0112	-0.0112	-0.0229	-0.0240	-0.0240	-0.0190**	0.0151	0.0151	-0.0059
	p-value	(0.6780)	(0.7150)	(0.0420)	(0.2980)	(0.1520)	(0.0330)	(0.5450)	(0.5790)	(0.5260)
Maturity	B	0.1499*	0.1499*	-0.0416	0.1269**	0.1269**	-0.0067	-0.0348	-0.0348	-0.0346*
	β	0.0735*	0.0735*	-0.0204	0.0970**	0.0970**	-0.0051	-0.0230	-0.0230	-0.0229*
	p-value	(0.0950)	(0.0530)	(0.2200)	(0.0290)	(0.0120)	(0.7330)	(0.6050)	(0.5820)	(0.0730)
%Equity	B	-0.0166	-0.0166*	0.0034	0.0026	0.0026*	0.0092***	-0.0163*	-0.0163*	-0.0031*
	β	-0.1095	-0.1095*	0.0228	0.0273	0.0273*	0.0946***	-0.1455*	-0.1455*	-0.0277*
	p-value	(0.1440)	(0.0620)	(0.2500)	(0.5770)	(0.0540)	(0.0000)	(0.0740)	(0.0610)	(0.1000)
Single-scheme	B	-0.6817	-0.6817	0.2315	-0.5724**	-0.5724**	-0.3795***	0.0195	0.0195	0.4907***
	β	-0.2234	-0.2234	0.0759	-0.2927**	-0.2927**	-0.1941***	0.0087	0.0087	0.2174***
	p-value	(0.2790)	(0.4110)	(0.1890)	(0.0380)	(0.0110)	(0.0000)	(0.9690)	(0.9780)	(0.0020)
%FR	B	0.0167	0.0167	-0.0078*	-0.0106*	-0.0106*	-0.0096***	0.0264**	0.0264	-0.0002
	β	0.0779	0.0779	-0.0364*	-0.0771*	-0.0771*	-0.0697***	0.1663**	0.1663	-0.0012
	p-value	(0.2000)	(0.3000)	(0.0820)	(0.0960)	(0.0650)	(0.0000)	(0.0300)	(0.1420)	(0.9510)
_cons	B	-1.5476	-1.5476	5.6154***	-0.1674	-0.1674	1.9844***	-1.4187	-1.4187	3.0128***
	p-value	(0.6840)	(0.7070)	(0.0000)	(0.9380)	(0.8470)	(0.0000)	(0.5730)	(0.7030)	(0.0000)
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
Number of companies		146	146	145	146	146	145	146	146	145
F-stat		7.25	1634.65		8.15	2714.63		3.16	1141.3	
Wald chi				481.26			1848.26			223.08
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
within		0.1294	0.1294		0.2145	0.2145		0.0533	0.0533	
between		0.0031			0.086			0.0115		
overall		0.0169			0.1332			0.001		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Debt, dividends and the contribution policy of DB schemes (H2)

Hypothesis 2 predicts that companies with high debt and higher dividend payouts are associated with lower pension contributions. The results in Tables 6.6 - 6.7 provide plausible evidence for this hypothesis. In particular, the estimated coefficients on *Debt-to-MC*Dividends* in Table 6.6 are negative when examining *TOTAL*-contributions and *DRCs*. The negative relationship of *Debt-to-MC*Dividends* suggests that high-debt companies which also pay higher dividends tend to pay lower DRCs. These findings indicate that risky companies seem to transfer wealth from the pension scheme members to shareholders by increasing dividends and reducing the additional pension contributions to DB schemes. This harms pension scheme members as it increases the likelihood of the pension scheme default.

Table 6.7 reports results on the combined effect of *Debt-to-TA* and *Dividends* on the contribution policy of DB schemes. The coefficients on *Debt-to-TA*Dividends* suggest that high debt companies which also pay higher dividends tend to reduce *REGULAR*-contributions. These findings suggest that risky companies seem to transfer wealth from the pension scheme members to shareholders by reducing regular pension contributions to DB schemes. This also harms the pension scheme members as it not only increases the likelihood of default but also lowers the value of pension assets. While it has been found that dividends alone have a positive effect on pension contributions, these results demonstrate how risk encompassed in the leverage induce companies to transfer the risk from shareholders to debtholders.

Table 6.6
Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs*. All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		Total-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-MC	B	-0.0314***	-0.0314***	-0.0171***	-0.0106*	-0.0106**	-0.0110***	-0.0195**	-0.0195**	-0.0100***
	β	-0.2304***	-0.2304***	-0.1253***	-0.1211*	-0.1211**	-0.1259***	-0.1930**	-0.1930**	-0.0990***
	p-value	(0.0020)	(0.0060)	(0.0000)	(0.0730)	(0.0160)	(0.0000)	(0.0370)	(0.0170)	(0.0010)
Dividends	B	0.2495**	0.2495***	0.1525***	0.0254	0.0254	0.0078	0.1994**	0.1994***	0.1429***
	β	0.4237**	0.4237***	0.2590***	0.0674	0.0674	0.0208	0.4578**	0.4578***	0.3280***
	p-value	(0.0120)	(0.0030)	(0.0000)	(0.6850)	(0.5370)	(0.5590)	(0.0160)	(0.0040)	(0.0000)
Debt-to-MC*Dividends	B	-0.0024**	-0.0024***	-0.0015***	-0.0003	-0.0003	-0.0001	-0.0018**	-0.0018***	-0.0013***
	β	-0.3581**	-0.3581***	-0.2254***	-0.0815	-0.0815	-0.0319	-0.3640**	-0.3640***	-0.2676***
	p-value	(0.0160)	(0.0060)	(0.0010)	(0.5710)	(0.4070)	(0.3760)	(0.0370)	(0.0100)	(0.0000)
Ln (Company-size)	B	0.9271**	0.9271**	-0.0037	0.4719**	0.4719***	0.1885***	0.4597*	0.4597	-0.1279***
	β	0.5584**	0.5584**	-0.0023	0.4435**	0.4435***	0.1771***	0.3744*	0.3744	-0.1041***
	p-value	(0.0280)	(0.0440)	(0.9440)	(0.0430)	(0.0000)	(0.0000)	(0.0940)	(0.2080)	(0.0050)
Profitability	B	0.0120	0.0120	0.0123	0.0153	0.0153**	0.0073*	0.0006	0.0006	0.0050
	β	0.0263	0.0263	0.0270	0.0522	0.0522**	0.0247*	0.0018	0.0018	0.0148
	p-value	(0.5280)	(0.4240)	(0.1520)	(0.1050)	(0.0380)	(0.0730)	(0.9720)	(0.9580)	(0.3650)
Cash	B	0.0270	0.0270*	0.0170**	0.0304***	0.0304**	0.0157***	-0.0088	-0.0088	-0.0055
	β	0.0572	0.0572*	0.0360**	0.1006***	0.1006**	0.0520***	-0.0251	-0.0251	-0.0158
	p-value	(0.1100)	(0.0890)	(0.0450)	(0.0060)	(0.0130)	(0.0000)	(0.5370)	(0.3870)	(0.3090)
Closure-to-FA	B	0.0726	0.0726*	-0.0580	0.0239	0.0239	-0.1255***	0.0395	0.0395*	0.0042
	β	0.0526	0.0526*	-0.0421	0.0271	0.0271	-0.1420***	0.0388	0.0388*	0.0041
	p-value	(0.4060)	(0.0530)	(0.1160)	(0.6320)	(0.3580)	(0.0000)	(0.5350)	(0.0750)	(0.8750)
Scheme-returns	B	-0.0045	-0.0045	-0.0070*	-0.0053	-0.0053*	-0.0044**	0.0030	0.0030	-0.0010
	β	-0.0144	-0.0144	-0.0221*	-0.0263	-0.0263*	-0.0219**	0.0129	0.0129	-0.0045
	p-value	(0.5840)	(0.5910)	(0.0520)	(0.2420)	(0.0940)	(0.0140)	(0.6000)	(0.5970)	(0.6340)
Maturity	B	0.1839**	0.1839**	-0.0558**	0.1352**	0.1352**	0.0013	-0.0115	-0.0115	-0.0324*
	β	0.0901**	0.0901**	-0.0273**	0.1034**	0.1034**	0.0010	-0.0076	-0.0076	-0.0215*
	p-value	(0.0370)	(0.0480)	(0.0900)	(0.0170)	(0.0130)	(0.9470)	(0.8660)	(0.8640)	(0.0770)
%Equity	B	-0.0167	-0.0167*	0.0038	0.0026	0.0026*	0.0094***	-0.0164*	-0.0164*	-0.0030
	β	-0.1106	-0.1106*	0.0248	0.0267	0.0267*	0.0969***	-0.1463*	-0.1463*	-0.0265
	p-value	(0.1420)	(0.0540)	(0.2470)	(0.5860)	(0.0740)	(0.0000)	(0.0730)	(0.0550)	(0.1450)
Single-scheme	B	-0.8240	-0.8240	0.2366	-0.6039**	-0.6039**	-0.4268***	-0.0753	-0.0753	0.5112***
	β	-0.2701	-0.2701	0.0775	-0.3088**	-0.3088**	-0.2182***	-0.0334	-0.0334	0.2265***
	p-value	(0.1900)	(0.3110)	(0.1730)	(0.0240)	(0.0120)	(0.0000)	(0.8830)	(0.9130)	(0.0010)
%FR	B	0.0138	0.0138	-0.0080*	-0.0111*	-0.0111*	-0.0089***	0.0244**	0.0244	0.0006
	β	0.0642	0.0642	-0.0372*	-0.0807*	-0.0807*	-0.0648***	0.1537**	0.1537	0.0041
	p-value	(0.2830)	(0.3780)	(0.0700)	(0.0710)	(0.0690)	(0.0000)	(0.0420)	(0.1620)	(0.8300)
_cons	B	-3.2360	-3.2360	4.5137***	-0.6458	-0.6458	1.5945***	-2.6456	-2.6456	2.5167***
	p-value	(0.3880)	(0.4110)	(0.0000)	(0.7480)	(0.5260)	(0.0000)	(0.2910)	(0.4690)	(0.0000)
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
		146	146	145	146	146	145	146	146	145
F-stat		7.01	817.19		8.29	736.77		3.26	815.28	
Wald chi				599.17			1474.51			256.36
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
within		0.1434	0.1434		0.2181	0.2181		0.0636	0.0636	
between		0.0021			0.0841			0.0183		
overall		0.0172			0.1309			0.0004		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.7

Regressions of *TOTAL-*, *REGULAR-* contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		Total-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-TA	B	-0.0165	-0.0165**	-0.0163***	-0.0025	-0.0025	-0.0050**	-0.0158*	-0.0158***	-0.0077***
	β	-0.1095	-0.1095**	-0.1083***	-0.0254	-0.0254	-0.0522**	-0.1415*	-0.1415***	-0.0689***
	p-value	(0.1590)	(0.0320)	(0.0000)	(0.6810)	(0.4660)	(0.0210)	(0.0870)	(0.0080)	(0.0100)
Dividends	B	0.1340	0.1340***	0.0428	0.0921	0.0921***	0.0400**	0.0046	0.0046	0.0216
	β	0.2275	0.2275***	0.0727	0.2441	0.2441***	0.1061**	0.0106	0.0106	0.0496
	p-value	(0.1960)	(0.0000)	(0.3080)	(0.1160)	(0.0000)	(0.0270)	(0.9180)	(0.8340)	(0.4360)
Debt-to-TA*Dividends	B	-0.0013	-0.0013***	-0.0003	-0.0013*	-0.0013***	-0.0006**	0.0004	0.0004	0.0001
	β	-0.1822	-0.1822***	-0.0428	-0.2693*	-0.2693***	-0.1301**	0.0680	0.0680	0.0190
	p-value	(0.2480)	(0.0000)	(0.5620)	(0.0540)	(0.0000)	(0.0120)	(0.4980)	(0.1010)	(0.7780)
Ln (Company-size)	B	0.7121*	0.7121*	-0.0680	0.3959*	0.3959***	0.1508***	0.3341	0.3341	-0.1476***
	β	0.4289*	0.4289*	-0.0410	0.3721*	0.3721***	0.1417***	0.2721	0.2721	-0.1202***
	p-value	(0.0840)	(0.0780)	(0.2000)	(0.0970)	(0.0050)	(0.0000)	(0.2060)	(0.3210)	(0.0020)
Profitability	B	-0.0104	-0.0104	0.0008	0.0007	0.0007	-0.0031	-0.0035	-0.0035	-0.0026
	β	-0.0227	-0.0227	0.0017	0.0026	0.0026	-0.0105	-0.0104	-0.0104	-0.0076
	p-value	(0.5650)	(0.6110)	(0.9160)	(0.9300)	(0.9400)	(0.4070)	(0.8210)	(0.8320)	(0.6060)
Cash	B	0.0252	0.0252	0.0187**	0.0294***	0.0294**	0.0164***	-0.0093	-0.0093	-0.0058
	β	0.0532	0.0532	0.0396**	0.0970***	0.0970**	0.0541***	-0.0266	-0.0266	-0.0167
	p-value	(0.1360)	(0.1120)	(0.0280)	(0.0040)	(0.0110)	(0.0000)	(0.5100)	(0.3660)	(0.2800)
Closure-to-FA	B	0.0814	0.0814**	-0.0732**	0.0254	0.0254	-0.1339***	0.0469	0.0469**	0.0058
	β	0.0590	0.0590**	-0.0531**	0.0287	0.0287	-0.1515***	0.0460	0.0460**	0.0057
	p-value	(0.3400)	(0.0430)	(0.0480)	(0.6090)	(0.3620)	(0.0000)	(0.4680)	(0.0190)	(0.8270)
Scheme-returns	B	-0.0040	-0.0040	-0.0071	-0.0053	-0.0053	-0.0043	0.0036	0.0036	-0.0012
	β	-0.0126	-0.0126	-0.0227	-0.0260	-0.0260	-0.0215	0.0156	0.0156	-0.0053
	p-value	(0.6450)	(0.6720)	(0.0450)	(0.2600)	(0.1120)	(0.0160)	(0.5320)	(0.5710)	(0.5730)
Maturity	B	0.1588*	0.1588*	-0.0419	0.1353**	0.1353**	-0.0042	-0.0372	-0.0372	-0.0351*
	β	0.0778*	0.0778*	-0.0205	0.1035**	0.1035**	-0.0032	-0.0247	-0.0247	-0.0233*
	p-value	(0.0690)	(0.0550)	(0.2150)	(0.0160)	(0.0150)	(0.8300)	(0.5830)	(0.5560)	(0.0730)
%Equity	B	-0.0166	-0.0166*	0.0034	0.0026	0.0026*	0.0093***	-0.0163*	-0.0163*	-0.0036*
	β	-0.1095	-0.1095*	0.0228	0.0272	0.0272*	0.0955***	-0.1455*	-0.1455*	-0.0326*
	p-value	(0.1440)	(0.0650)	(0.2580)	(0.5780)	(0.0540)	(0.0000)	(0.0740)	(0.0600)	(0.0670)
Single-scheme	B	-0.7112	-0.7112	0.2357	-0.6004**	-0.6004***	-0.3923***	0.0277	0.0277	0.5144***
	β	-0.2331	-0.2331	0.0773	-0.3070**	-0.3070***	-0.2006***	0.0123	0.0123	0.2279***
	p-value	(0.2730)	(0.4020)	(0.1830)	(0.0360)	(0.0050)	(0.0000)	(0.9560)	(0.9690)	(0.0010)
%FR	B	0.0160	0.0160	-0.0077*	-0.0113*	-0.0113*	-0.0100***	0.0266**	0.0266	0.0000
	β	0.0747	0.0747	-0.0360*	-0.0818*	-0.0818*	-0.0729***	0.1675**	0.1675	0.0001
	p-value	(0.2210)	(0.3160)	(0.0870)	(0.0690)	(0.0610)	(0.0000)	(0.0300)	(0.1390)	(0.9970)
_cons	B	-1.5901	-1.5901	5.5757***	-0.2076	-0.2076	1.8869***	-1.4070	-1.4070	3.0428***
	p-value	(0.6760)	(0.7000)	(0.0000)	(0.9240)	(0.8260)	(0.0000)	(0.5760)	(0.7070)	(0.0000)
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
		146	146	145	146	146	145	146	146	145
F-stat		6.63	402.45		9.46	3853.79		3.12	180.72	
Wald chi				456.71			2250.74			221.21
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Within		0.1317	0.1317		0.2233	0.2233		0.0536	0.0536	
Between		0.0033			0.0836			0.0112		
overall		0.0168			0.1345			0.0012		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Robustness check

As the level of debt may vary from industry to industry, this study uses the difference between the company's debt ratio and industry average debt ratio to check the robustness of the results. It is expected that the difference between the company's debt ratio and industry average debt ratio are negatively associated with the pension contribution. The higher difference means that the company's debt ratio exceeds the industry average and companies may face difficulties in raising new funds or incur higher of cost of borrowing additional funds because of the higher risk of bankruptcy. The results reported in Tables 6.8 and 6.9 are similar in direction and significance to the results discussed above. In particular, in Table 6.8, it is found that the difference between the company's *Debt-to-MC* and industry average *Debt-to-MC*, *Debt-to-MC-IndustryDiff*, are negatively associated with *TOTAL-*, *REGULAR-* contributions and *DRCs*. The estimated coefficients also remain negative and statistically significant when the difference between the company's *Debt-to-TA* and industry average *Debt-to-TA* is used (Table 6.9).

As the level of debt may also vary from year to year, this study uses the difference between the company's debt ratio in period *t* and the average debt ratio in period *t*. The results in Tables 6.10 - 6.11 are also similar in direction and significance to the results discussed above. In particular, *TOTAL-*, *REGULAR-* contributions and *DRCs* are found to be negatively related to the difference between company's *Debt-to-MC* in period *t* and year average *Debt-to-MC* n period *t* (Table 6.10) and between company's *Debt-to-TA* in period *t* and year average *Debt-to-TA* in period *t* (Table 6.11).

Tables 6.12-6.13 further report estimates on the interaction effect of the difference between the company's *debt* and industry average *debt* relative to the market capitalisation (*Debt-to-MC-Industry)* and total assets (*Debt-to-TA-Industry)* and *Dividends*. The estimated effects remain consistent with the effects discussed previously. Tables 6.14-6.15 further report estimates on the interaction effect of the difference between the company's *debt* in period *t* and year average *debt* period *t* relative to the market capitalisation (*Debt-to-MC-Industry)* and total assets (*Debt-to-TA-Industry)*

Tables 6.16 and 6.17 report results from the regressions examining all companies in the sample. The results are also similar in direction and significance to the estimated obtained for the sample of non-financial companies. Therefore, results are also robust to the inclusion of financial companies in the analysis. Lastly, regressions are re-run without winsorizing dependent variables. The obtained results (results are not tabulated) remain consistent with those discussed above. These additional results support the core findings of this study.

Table 6.8

Regressions of *TOTAL-*, *REGULAR-* contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-MC-Industry	B	-0.0336***	-0.0336***	-0.0212***	-0.0109*	-0.0109**	-0.0113***	-0.0211**	-0.0211**	-0.0118***
	β	-0.2081***	-0.2081***	-0.1312***	-0.1053*	-0.1053**	-0.1093***	-0.1767**	-0.1767**	-0.0987***
	p-value	(0.0010)	(0.0040)	0.0000	(0.0640)	(0.0140)	0.0000	(0.0230)	(0.0130)	0.0000
Ln (Company-size)	B	0.9247**	0.9247*	-0.0117	0.4716**	0.4716***	0.1910***	0.4579*	0.4579	-0.1163**
	β	0.5570**	0.5570*	-0.0070	0.4432**	0.4432***	0.1795***	0.3729*	0.3729	-0.0947**
	p-value	(0.0270)	(0.0530)	(0.8280)	(0.0420)	0.0000	0.0000	(0.0940)	(0.2320)	(0.0120)
Profitability	B	0.0199	0.0199	0.0146*	0.0165*	0.0165**	0.0070*	0.0066	0.0066	0.0066
	β	0.0435	0.0435	0.0319*	0.0561*	0.0561**	0.0240*	0.0194	0.0194	0.0195
	p-value	(0.3520)	(0.2380)	(0.0580)	(0.0840)	(0.0430)	(0.0850)	(0.7230)	(0.5530)	(0.2450)
Dividends	B	0.0363*	0.0363***	0.0216**	-0.0057	-0.0057	-0.0036	0.0391***	0.0391***	0.0328***
	β	0.0616*	0.0616***	0.0366**	-0.0150	-0.0150	-0.0095	0.0898***	0.0898***	0.0754***
	p-value	(0.0780)	(0.0040)	(0.0270)	(0.6410)	(0.1550)	(0.3040)	0.0000	(0.0090)	0.0000
Cash	B	0.0261	0.0261	0.0150*	0.0303***	0.0303**	0.0155***	-0.0094	-0.0094	-0.0072
	β	0.0553	0.0553	0.0317*	0.1001***	0.1001**	0.0514***	-0.0270	-0.0270	-0.0207
	p-value	(0.1360)	(0.1110)	(0.0730)	(0.0060)	(0.0130)	0.0000	(0.5030)	(0.3460)	(0.1790)
Closure-to-FA	B	0.0732	0.0732*	-0.0622*	0.0240	0.0240	-0.1253***	0.0401	0.0401*	0.0079
	β	0.0531	0.0531*	-0.0451*	0.0272	0.0272	-0.1418***	0.0393	0.0393*	0.0077
	p-value	(0.3910)	(0.0560)	(0.0890)	(0.6270)	(0.3600)	0.0000	(0.5350)	(0.0770)	(0.7650)
Scheme-returns	B	-0.0053	-0.0053	-0.0072**	-0.0054	-0.0054*	-0.0041**	0.0024	0.0024	-0.0016
	β	-0.0168	-0.0168	-0.0228**	-0.0269	-0.0269*	-0.0204**	0.0104	0.0104	-0.0069
	p-value	(0.5280)	(0.5430)	(0.0430)	(0.2370)	(0.0920)	(0.0210)	(0.6740)	(0.6760)	(0.4630)
Maturity	B	0.1687*	0.1687**	-0.0539	0.1329**	0.1329**	0.0006	-0.0229	-0.0229	-0.0358*
	β	0.0827*	0.0827**	-0.0264	0.1017**	0.1017**	0.0004	-0.0152	-0.0152	-0.0237*
	p-value	(0.0620)	(0.0400)	(0.1180)	(0.0220)	(0.0110)	(0.9770)	(0.7350)	(0.7220)	(0.0610)
%Equity	B	-0.0168	-0.0168*	0.0029	0.0026	0.0026*	0.0096***	-0.0164*	-0.0164*	-0.0042**
	β	-0.1108	-0.1108*	0.0193	0.0266	0.0266*	0.0990***	-0.1465*	-0.1465*	-0.0372**
	p-value	(0.1380)	(0.0530)	(0.3440)	(0.5870)	(0.0750)	0.0000	(0.0710)	(0.0560)	(0.0430)
Single-scheme	B	-0.7312	-0.7312	0.1845	-0.5904**	-0.5904**	-0.4334***	-0.0056	-0.0056	0.5565***
	β	-0.2396	-0.2396	0.0605	-0.3019**	-0.3019**	-0.2216***	-0.0025	-0.0025	0.2466***
	p-value	(0.2270)	(0.3550)	(0.2970)	(0.0260)	(0.0150)	0.0000	(0.9910)	(0.9930)	0.0000
%FR	B	0.0167	0.0167	-0.0101**	-0.0107*	-0.0107*	-0.0089***	0.0266**	0.0266	0.0005
	β	0.0777	0.0777	-0.0470**	-0.0777*	-0.0777*	-0.0649***	0.1674**	0.1674	0.0034
	p-value	(0.1960)	(0.2810)	(0.0210)	(0.0890)	(0.0840)	0.0000	(0.0280)	(0.1280)	(0.8640)
_cons	B	-4.4992	-4.4992	4.2772***	-1.0754	-1.0754	1.1504***	-3.4252	-3.4252	2.3079***
	p-value	(0.2300)	(0.3010)	0.0000	(0.5850)	(0.2470)	(0.0010)	(0.1710)	(0.3900)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
Number of companies		146	146	145	146	146	145	146	146	145
F-stat		7.68	631.26		8.42	1183.28		3.06	1246.97	
Wald chi				692.43			1574.24			223.45
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
within		0.1354	0.1354		0.2174	0.2174		0.0564	0.0564	
between		0.0018			0.0826			0.0155		
overall		0.0175			0.1296			0.0006		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.9
Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-MC-Year	B	-0.0306***	-0.0306***	-0.0207***	-0.0106**	-0.0106***	-0.0096***	-0.0187**	-0.0187***	-0.0108***
	ß	-0.2188***	-0.2188***	-0.1484***	-0.1187**	-0.1187***	-0.1077***	-0.1811**	-0.1811***	-0.1047***
	p-value	(0.0020)	(0.0010)	0.0000	(0.0500)	(0.0080)	0.0000	(0.0380)	(0.0080)	0.0000
Ln (Company-size)	B	0.9009**	0.9009**	-0.0155	0.4680**	0.4680***	0.1885***	0.4402	0.4402	-0.1238***
	ß	0.5426**	0.5426**	-0.0093	0.4399**	0.4399***	0.1772***	0.3585	0.3585	-0.1008***
	p-value	(0.0310)	(0.0500)	(0.7700)	(0.0450)	0.0000	0.0000	(0.1070)	(0.2250)	(0.0080)
Profitability	B	0.0168	0.0168	0.0138**	0.0160*	0.0160**	0.0046	0.0042	0.0042	0.0051
	ß	0.0368	0.0368	0.0302**	0.0547*	0.0547**	0.0157	0.0125	0.0125	0.0149
	p-value	(0.4230)	(0.3510)	(0.0490)	(0.0860)	(0.0420)	(0.2470)	(0.8140)	(0.7460)	(0.3610)
Dividends	B	0.0352*	0.0352***	0.0217**	-0.0058	-0.0058	-0.0039	0.0383***	0.0383***	0.0325***
	ß	0.0597*	0.0597***	0.0368**	-0.0154	-0.0154	-0.0104	0.0878***	0.0878***	0.0745***
	p-value	(0.0850)	(0.0030)	(0.0260)	(0.6320)	(0.1220)	(0.2660)	0.0000	(0.0070)	0.0000
Cash	B	0.0264	0.0264	0.0163**	0.0304***	0.0304**	0.0158***	-0.0092	-0.0092	-0.0063
	ß	0.0559	0.0559	0.0344**	0.1003***	0.1003**	0.0521***	-0.0265	-0.0265	-0.0181
	p-value	(0.1310)	(0.1110)	(0.0410)	(0.0060)	(0.0140)	0.0000	(0.5130)	(0.3550)	(0.2400)
Closure-to-FA	B	0.0720	0.0720*	-0.0635*	0.0233	0.0233	-0.1250***	0.0395	0.0395*	0.0075
	ß	0.0522	0.0522*	-0.0461*	0.0264	0.0264	-0.1414***	0.0387	0.0387*	0.0074
	p-value	(0.3990)	(0.0660)	(0.0790)	(0.6370)	(0.3890)	0.0000	(0.5400)	(0.0770)	(0.7760)
Scheme-returns	B	-0.0024	-0.0024	-0.0054	-0.0045	-0.0045	-0.0034*	0.0043	0.0043	-0.0010
	ß	-0.0075	-0.0075	-0.0173	-0.0221	-0.0221	-0.0167*	0.0182	0.0182	-0.0042
	p-value	(0.7800)	(0.8060)	(0.1220)	(0.3380)	(0.1770)	(0.0570)	(0.4690)	(0.4990)	(0.6580)
Maturity	B	0.1633*	0.1633**	-0.0547	0.1315**	0.1315***	-0.0018	-0.0265	-0.0265	-0.0334*
	ß	0.0800*	0.0800**	-0.0268	0.1006**	0.1006***	-0.0014	-0.0175	-0.0175	-0.0221*
	p-value	(0.0710)	(0.0410)	(0.1130)	(0.0230)	(0.0100)	(0.9250)	(0.6950)	(0.6800)	(0.0790)
%Equity	B	-0.0171	-0.0171*	0.0032	0.0025	0.0025*	0.0095***	-0.0166*	-0.0166*	-0.0041**
	ß	-0.1129	-0.1129*	0.0214	0.0254	0.0254*	0.0979***	-0.1482*	-0.1482*	-0.0370**
	p-value	(0.1310)	(0.0540)	(0.2800)	(0.6030)	(0.0910)	0.0000	(0.0690)	(0.0560)	(0.0440)
Single-scheme	B	-0.7143	-0.7143	0.1855	-0.5869**	-0.5869**	-0.4206***	0.0064	0.0064	0.5484
	ß	-0.2341	-0.2341	0.0608	-0.3001**	-0.3001**	-0.2151***	0.0028	0.0028	0.2430
	p-value	(0.2400)	(0.3740)	(0.2930)	(0.0280)	(0.0150)	0.0000	(0.9900)	(0.9930)	0.0000
%FR	B	0.0164	0.0164	-0.0109	-0.0108*	-0.0108*	-0.0090***	0.0264**	0.0264	0.0000
	ß	0.0764	0.0764	-0.0506**	-0.0787*	-0.0787*	-0.0655***	0.1665**	0.1665	-0.0002
	p-value	(0.2060)	(0.2900)	(0.0110)	(0.0850)	(0.0810)	0.0000	(0.0300)	(0.1320)	(0.9920)
_cons	B	-4.5605	-4.5605	4.1002***	-1.1342	-1.1342	1.0885***	-3.4375	-3.4375	2.2696***
	p-value	(0.2240)	(0.2870)	0.0000	(0.5650)	(0.2210)	(0.0030)	(0.1700)	(0.3760)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
Number of companies		146	146	145	146	146	145	146	146	145
F-stat		7.77	431.01		8.42	16616.56		3.06	10847.15	
Wald chi				706.35			1481.5			220.3
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
within		0.1343	0.1343		0.2174	0.2174		0.0555	0.0555	
between		0.0029			0.0848			0.0201		
overall		0.0164			0.1319			0.0003		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.10

Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-TA-Industry	B	-0.0107	-0.0107	-0.0150***	-0.0048	-0.0048*	-0.0064***	-0.0090	-0.0090	-0.0062**
	β	-0.0757	-0.0757	-0.1064***	-0.0528	-0.0528*	-0.0705***	-0.0869	-0.0869	-0.0593**
	p-value	(0.3590)	(0.2970)	0.0000	(0.3460)	(0.0900)	(0.0010)	(0.3160)	(0.2020)	(0.0240)
Ln (Company-size)	B	0.7207*	0.7207*	-0.0785	0.4052*	0.4052***	0.1535***	0.3293	0.3293	-0.1459***
	β	0.4341*	0.4341*	-0.0473	0.3808*	0.3808***	0.1443***	0.2682	0.2682	-0.1188***
	p-value	(0.0790)	(0.0750)	(0.1410)	(0.0880)	(0.0020)	0.0000	(0.2120)	(0.3270)	(0.0020)
Profitability	B	-0.0045	-0.0045	0.0009	0.0090	0.0090	-0.0020	-0.0079	-0.0079	-0.0033
	β	-0.0098	-0.0098	0.0020	0.0308	0.0308	-0.0067	-0.0233	-0.0233	-0.0098
	p-value	(0.8140)	(0.8480)	(0.9010)	(0.2440)	(0.3430)	(0.5860)	(0.6050)	(0.6400)	(0.4970)
Dividends	B	0.0264	0.0264***	0.0159*	-0.0087	-0.0087*	-0.0057*	0.0332***	0.0332***	0.0289***
	β	0.0449	0.0449***	0.0270*	-0.0230	-0.0230*	-0.0152*	0.0763***	0.0763***	0.0664***
	p-value	(0.1540)	(0.0020)	(0.0890)	(0.4500)	(0.0650)	(0.0940)	0.0000	(0.0050)	0.0000
Cash	B	0.0271	0.0271	0.0183**	0.0304***	0.0304**	0.0164***	-0.0092	-0.0092	-0.0060
	β	0.0573	0.0573	0.0388**	0.1006***	0.1006**	0.0542***	-0.0262	-0.0262	-0.0172
	p-value	(0.1300)	(0.1050)	(0.0310)	(0.0050)	(0.0150)	0.0000	(0.5200)	(0.3700)	(0.2600)
Closure-to-FA	B	0.0853	0.0853**	-0.0766**	0.0279	0.0279	-0.1404***	0.0475	0.0475**	0.0106
	β	0.0619	0.0619**	-0.0556**	0.0316	0.0316	-0.1589***	0.0466	0.0466**	0.0104
	p-value	(0.3200)	(0.0420)	(0.0380)	(0.5670)	(0.3200)	0.0000	(0.4640)	(0.0160)	(0.6830)
Scheme-returns	B	-0.0034	-0.0034	-0.0070**	-0.0048	-0.0048	-0.0038**	0.0036	0.0036	-0.0014
	β	-0.0109	-0.0109	-0.0223**	-0.0239	-0.0239	-0.0187**	0.0154	0.0154	-0.0058
	p-value	(0.6860)	(0.7260)	(0.0480)	(0.3010)	(0.1570)	(0.0350)	(0.5340)	(0.5720)	(0.5310)
Maturity	B	0.1514*	0.1514**	-0.0401	0.1274**	0.1274**	-0.0068	-0.0336	-0.0336	-0.0355*
	β	0.0742*	0.0742**	-0.0196	0.0974**	0.0974**	-0.0052	-0.0223	-0.0223	-0.0235*
	p-value	(0.0910)	(0.0480)	(0.2320)	(0.0290)	(0.0120)	(0.7310)	(0.6150)	(0.5890)	(0.0670)
%Equity	B	-0.0165	-0.0165*	0.0033	0.0027	0.0027*	0.0092***	-0.0162*	-0.0162*	-0.0031
	β	-0.1090	-0.1090*	0.0219	0.0276	0.0276*	0.0951***	-0.1449*	-0.1449*	-0.0274
	p-value	(0.1480)	(0.0650)	(0.2700)	(0.5730)	(0.0540)	0.0000	(0.0760)	(0.0630)	(0.1030)
Single-scheme	B	-0.6567	-0.6567	0.2047	-0.5696**	-0.5696**	-0.3788***	0.0350	0.0350	0.5018***
	β	-0.2153	-0.2153	0.0671	-0.2913**	-0.2913**	-0.1937***	0.0155	0.0155	0.2224***
	p-value	(0.3020)	(0.4340)	(0.2500)	(0.0390)	(0.0120)	0.0000	(0.9460)	(0.9610)	(0.0010)
%FR	B	0.0171	0.0171	-0.0083*	-0.0107*	-0.0107*	-0.0096***	0.0266**	0.0266	0.0002
	β	0.0799	0.0799	-0.0388*	-0.0777*	-0.0777*	-0.0697***	0.1674**	0.1674	0.0011
	p-value	(0.1920)	(0.3110)	(0.0630)	(0.0970)	(0.0610)	0.0000	(0.0300)	(0.1530)	(0.9530)
_cons	B	-2.7848	-2.7848	4.8295***	-0.5060	-0.5060	1.5899***	-2.3245	-2.3245	2.5642***
	p-value	(0.4470)	(0.4810)	0.0000	(0.8040)	(0.6100)	0.0000	(0.3400)	(0.5290)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
		146	146	145	146	146	145	146	146	145
F-stat		6.99	1843.7		8.12	3169.86		3.05	691.39	
Wald chi				490.5			1870.38			216.35
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
within		0.1274	0.1274		0.2142	0.2142		0.0518	0.0518	
between		0.0037			0.084			0.0104		
overall		0.015			0.1301			0.0011		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.11

Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-TA-Year	B	-0.0105	-0.0105	-0.0154***	-0.0041	-0.0041*	-0.0060***	-0.0095	-0.0095	-0.0064**
	ß	-0.0808	-0.0808	-0.1187***	-0.0496	-0.0496*	-0.0728***	-0.0990	-0.0990	-0.0672**
	p-value	(0.3670)	(0.2830)	0.0000	(0.4060)	(0.0960)	(0.0010)	(0.2930)	(0.1610)	(0.0190)
Ln (Company-size)	B	0.7200*	0.7200*	-0.0778	0.4050*	0.4050***	0.1537***	0.3285	0.3285	-0.1459***
	ß	0.4337*	0.4337*	-0.0469	0.3806*	0.3806***	0.1444***	0.2675	0.2675	-0.1188***
	p-value	(0.0790)	(0.0750)	(0.1450)	(0.0880)	(0.0020)	0.0000	(0.2130)	(0.3280)	(0.0020)
Profitability	B	-0.0046	-0.0046	0.0011	0.0088	0.0088	-0.0020	-0.0077	-0.0077	-0.0033
	ß	-0.0099	-0.0099	0.0023	0.0299	0.0299	-0.0069	-0.0228	-0.0228	-0.0098
	p-value	(0.8110)	(0.8440)	(0.8820)	(0.2570)	(0.3500)	(0.5740)	(0.6120)	(0.6440)	(0.4990)
Dividends	B	0.0264	0.0264***	0.0162*	-0.0088	-0.0088*	-0.0058*	0.0333***	0.0333***	0.0291***
	ß	0.0449	0.0449***	0.0276*	-0.0233	-0.0233*	-0.0153*	0.0764***	0.0764***	0.0667***
	p-value	(0.1550)	(0.0020)	(0.0820)	(0.4450)	(0.0600)	(0.0900)	0.0000	(0.0050)	0.0000
Cash	B	0.0270	0.0270	0.0182**	0.0305***	0.0305**	0.0163***	-0.0093	-0.0093	-0.0060
	ß	0.0572	0.0572	0.0385**	0.1008***	0.1008**	0.0540***	-0.0266	-0.0266	-0.0173
	p-value	(0.1310)	(0.1060)	(0.0320)	(0.0050)	(0.0150)	0.0000	(0.5150)	(0.3660)	(0.2590)
Closure-to-FA	B	0.0852	0.0852**	-0.0775**	0.0279	0.0279	-0.1397***	0.0475	0.0475**	0.0105
	ß	0.0618	0.0618**	-0.0562**	0.0316	0.0316	-0.1581***	0.0465	0.0465**	0.0103
	p-value	(0.3200)	(0.0430)	(0.0360)	(0.5670)	(0.3220)	0.0000	(0.4650)	(0.0160)	(0.6860)
Scheme-returns	B	-0.0031	-0.0031	-0.0065*	-0.0047	-0.0047	-0.0036**	0.0039	0.0039	-0.0012
	ß	-0.0098	-0.0098	-0.0206*	-0.0232	-0.0232	-0.0178**	0.0167	0.0167	-0.0052
	p-value	(0.7170)	(0.7520)	(0.0670)	(0.3140)	(0.1700)	(0.0440)	(0.5060)	(0.5470)	(0.5730)
Maturity	B	0.1513*	0.1513**	-0.0407	0.1274**	0.1274**	-0.0071	-0.0336	-0.0336	-0.0352*
	ß	0.0742*	0.0742**	-0.0199	0.0974**	0.0974**	-0.0054	-0.0223	-0.0223	-0.0233*
	p-value	(0.0910)	(0.0480)	(0.2260)	(0.0290)	(0.0120)	(0.7180)	(0.6150)	(0.5900)	(0.0690)
%Equity	B	-0.0165	-0.0165*	0.0033	0.0027	0.0027*	0.0092***	-0.0162*	-0.0162*	-0.0030
	ß	-0.1090	-0.1090*	0.0221	0.0275	0.0275*	0.0946***	-0.1450*	-0.1450*	-0.0271
	p-value	(0.1480)	(0.0650)	(0.2680)	(0.5740)	(0.0540)	0.0000	(0.0760)	(0.0630)	(0.1060)
Single-scheme	B	-0.6569	-0.6569	0.2035	-0.5682**	-0.5682**	-0.3789***	0.0333	0.0333	0.4995***
	ß	-0.2153	-0.2153	0.0667	-0.2906**	-0.2906**	-0.1938***	0.0148	0.0148	0.2214***
	p-value	(0.3020)	(0.4340)	(0.2530)	(0.0390)	(0.0120)	0.0000	(0.9480)	(0.9630)	(0.0010)
%FR	B	0.0171	0.0171	-0.0084*	-0.0106*	-0.0106*	-0.0096***	0.0265**	0.0265	0.0001
	ß	0.0798	0.0798	-0.0391*	-0.0772*	-0.0772*	-0.0696***	0.1668**	0.1668	0.0004
	p-value	(0.1930)	(0.3110)	(0.0610)	(0.0990)	(0.0640)	0.0000	(0.0300)	(0.1540)	(0.9850)
_cons	B	-2.8159	-2.8159	4.6512***	-0.5241	-0.5241	1.5188***	-2.3465	-2.3465	2.4975***
	p-value	(0.4410)	(0.4730)	0.0000	(0.7970)	(0.6010)	0.0000	(0.3360)	(0.5230)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
		146	146	145	146	146	145	146	146	145
F-stat		7.01	1212.74		8.11	2131.71		3.06	1144.95	
Wald chi				487.23			1887.29			217.27
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Within		0.1274	0.1274		0.214	0.214		0.0519	0.0519	
Between		0.0042			0.085			0.0124		
Overall		0.0145			0.1312			0.0007		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.12

Regressions of *TOTAL-*, *REGULAR-* contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-MC-Industry	B	-0.0311***	-0.0311***	-0.0168***	-0.0107*	-0.0107**	-0.0111***	-0.0191**	-0.0191**	-0.0096***
	β	-0.1929***	-0.1929***	-0.1040***	-0.1031*	-0.1031**	-0.1077***	-0.1601**	-0.1601**	-0.0802***
	p-value	(0.0020)	(0.0060)	0.0000	(0.0720)	(0.0160)	0.0000	(0.0400)	(0.0180)	(0.0010)
Dividends	B	0.1461**	0.1461***	0.0934***	0.0045	0.0045	0.0002	0.1283***	0.1283***	0.0964***
	β	0.2481**	0.2481***	0.1587***	0.0119	0.0119	0.0005	0.2945***	0.2945***	0.2213***
	p-value	(0.0110)	(0.0020)	0.0000	(0.9030)	(0.8450)	(0.9800)	(0.0060)	(0.0010)	0.0000
Debt-to-MC-Industry*Dividends	B	-0.0023**	-0.0023***	-0.0016***	-0.0002	-0.0002	-0.0001	-0.0019**	-0.0019***	-0.0015***
	β	-0.1926**	-0.1926***	-0.1331***	-0.0278	-0.0278	-0.0118	-0.2115**	-0.2115***	-0.1724***
	p-value	(0.0200)	(0.0070)	0.0000	(0.7240)	(0.5980)	(0.5590)	(0.0280)	(0.0080)	0.0000
Ln (Company-size)	B	0.9252**	0.9252**	-0.0021	0.4716**	0.4716***	0.1890***	0.4583*	0.4583	-0.1246***
	β	0.5573**	0.5573**	-0.0013	0.4433**	0.4433***	0.1776***	0.3732*	0.3732	-0.1014***
	p-value	(0.0290)	(0.0460)	(0.9680)	(0.0430)	0.0000	0.0000	(0.0950)	(0.2100)	(0.0060)
Profitability	B	0.0132	0.0132	0.0130	0.0158*	0.0158**	0.0073*	0.0011	0.0011	0.0053
	β	0.0289	0.0289	0.0284	0.0540*	0.0540**	0.0249*	0.0033	0.0033	0.0156
	p-value	(0.4870)	(0.3920)	(0.1270)	(0.0960)	(0.0350)	(0.0710)	(0.9480)	(0.9230)	(0.3400)
Cash	B	0.0271	0.0271*	0.0174**	0.0304***	0.0304**	0.0157***	-0.0087	-0.0087	-0.0049
	β	0.0574	0.0574*	0.0369**	0.1004***	0.1004**	0.0519***	-0.0248	-0.0248	-0.0139
	p-value	(0.1100)	(0.0880)	(0.0390)	(0.0060)	(0.0130)	0.0000	(0.5430)	(0.3960)	(0.3680)
Closure-to-FA	B	0.0714	0.0714*	-0.0580	0.0239	0.0239	-0.1260***	0.0385	0.0385*	0.0026
	β	0.0518	0.0518*	-0.0420	0.0270	0.0270	-0.1426***	0.0378	0.0378*	0.0026
	p-value	(0.4140)	(0.0560)	(0.1150)	(0.6310)	(0.3590)	0.0000	(0.5450)	(0.0800)	(0.9210)
Scheme-returns	B	-0.0046	-0.0046	-0.0071**	-0.0054	-0.0054*	-0.0044**	0.0030	0.0030	-0.0011
	β	-0.0146	-0.0146	-0.0224**	-0.0266	-0.0266*	-0.0219**	0.0128	0.0128	-0.0048
	p-value	(0.5790)	(0.5870)	(0.0490)	(0.2380)	(0.0930)	(0.0140)	(0.6000)	(0.5990)	(0.6060)
Maturity	B	0.1834**	0.1834**	-0.0556*	0.1343**	0.1343**	0.0008	-0.0109	-0.0109	-0.0315*
	β	0.0899**	0.0899**	-0.0272*	0.1027**	0.1027**	0.0006	-0.0073	-0.0073	-0.0209*
	p-value	(0.0380)	(0.0470)	(0.0900)	(0.0180)	(0.0120)	(0.9680)	(0.8720)	(0.8690)	(0.0830)
%Equity	B	-0.0167	-0.0167*	0.0038	0.0026	0.0026*	0.0094***	-0.0163*	-0.0163*	-0.0028
	β	-0.1103	-0.1103*	0.0248	0.0267	0.0267*	0.0967***	-0.1459*	-0.1459*	-0.0248
	p-value	(0.1430)	(0.0550)	(0.2450)	(0.5860)	(0.0750)	0.0000	(0.0740)	(0.0560)	(0.1730)
Single-scheme	B	-0.8154	-0.8154	0.2301	-0.5981**	-0.5981**	-0.4258***	-0.0740	-0.0740	0.5104***
	β	-0.2672	-0.2672	0.0754	-0.3059**	-0.3059**	-0.2178***	-0.0328	-0.0328	0.2262***
	p-value	(0.1920)	(0.3150)	(0.1840)	(0.0250)	(0.0140)	0.0000	(0.8850)	(0.9150)	(0.0010)
%FR	B	0.0137	0.0137	-0.0082*	-0.0110*	-0.0110*	-0.0089***	0.0242**	0.0242	0.0007
	β	0.0639	0.0639	-0.0384*	-0.0797*	-0.0797*	-0.0647***	0.1522**	0.1522	0.0043
	p-value	(0.2850)	(0.3800)	(0.0600)	(0.0740)	(0.0710)	0.0000	(0.0440)	(0.1660)	(0.8190)
_cons	B	-4.5015	-4.5015	3.8469***	-1.0756	-1.0756	1.1662***	-3.4270	-3.4270	2.0772***
	p-value	(0.2310)	(0.2920)	0.0000	(0.5850)	(0.2560)	(0.0010)	(0.1690)	(0.3780)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
Number of companies		146	146	145	146	146	145	146	146	145
F-stat		7.06	585.21		8.27	6691.96		3.26	407.06	
Wald chi				618.43			1483.78			263.34
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Within		0.143	0.143		0.2177	0.2177		0.0644	0.0644	
Between		0.0015			0.0819			0.0135		
overall		0.0184			0.1291			0.001		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.13
Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs*. All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-MC-Year	B	-0.0259***	-0.0259***	-0.0148***	-0.0096*	-0.0096**	-0.0089***	-0.0157*	-0.0157**	-0.0084***
	β	-0.1856***	-0.1856***	-0.1057***	-0.1074*	-0.1074**	-0.1000***	-0.1520*	-0.1520**	-0.0810***
	p-value	(0.0080)	(0.0020)	0.0000	(0.0830)	(0.0130)	0.0000	(0.0820)	(0.0200)	(0.0040)
Dividends	B	0.1478***	0.1478***	0.0891***	0.0187	0.0187	0.0036	0.1113***	0.1113***	0.0755***
	β	0.2510***	0.2510***	0.1513***	0.0495	0.0495	0.0095	0.2555***	0.2555***	0.1734***
	p-value	(0.0040)	0.0000	0.0000	(0.6140)	(0.3840)	(0.6020)	(0.0090)	(0.0020)	0.0000
Debt-to-MC-Year*Dividends	B	-0.0031***	-0.0031***	-0.0019***	-0.0007	-0.0007	-0.0002	-0.0020**	-0.0020***	-0.0013***
	β	-0.2126***	-0.2126***	-0.1273***	-0.0721	-0.0721	-0.0248	-0.1864**	-0.1864***	-0.1218***
	p-value	(0.0080)	(0.0010)	0.0000	(0.4020)	(0.1700)	(0.2070)	(0.0480)	(0.0100)	0.0000
Ln (Company-size)	B	0.8918**	0.8918**	-0.0137	0.4660**	0.4660***	0.1851***	0.4342	0.4342	-0.1339***
	β	0.5371**	0.5371**	-0.0083	0.4380**	0.4380***	0.1740***	0.3536	0.3536	-0.1091***
	p-value	(0.0340)	(0.0470)	(0.7930)	(0.0460)	(0.0010)	0.0000	(0.1110)	(0.2170)	(0.0030)
Profitability	B	0.0073	0.0073	0.0101	0.0140	0.0140*	0.0047	-0.0020	-0.0020	0.0026
	β	0.0159	0.0159	0.0222	0.0476	0.0476*	0.0160	-0.0058	-0.0058	0.0078
	p-value	(0.6930)	(0.6670)	(0.2060)	(0.1320)	(0.0520)	(0.2370)	(0.9080)	(0.8890)	(0.6270)
Cash	B	0.0269	0.0269*	0.0186**	0.0305***	0.0305**	0.0161***	-0.0089	-0.0089	-0.0053
	β	0.0569	0.0569*	0.0393**	0.1006***	0.1006**	0.0530***	-0.0256	-0.0256	-0.0152
	p-value	(0.1040)	(0.0820)	(0.0150)	(0.0050)	(0.0120)	0.0000	(0.5310)	(0.3760)	(0.3270)
Closure-to-FA	B	0.0703	0.0703*	-0.0596	0.0229	0.0229	-0.1236***	0.0384	0.0384*	0.0042
	β	0.0510	0.0510*	-0.0433	0.0260	0.0260	-0.1399***	0.0377	0.0377*	0.0041
	p-value	(0.4200)	(0.0670)	(0.1060)	(0.6480)	(0.3940)	0.0000	(0.5460)	(0.0660)	(0.8750)
Scheme-returns	B	-0.0010	-0.0010	-0.0051	-0.0042	-0.0042	-0.0036	0.0052	0.0052	-0.0004
	β	-0.0031	-0.0031	-0.0163	-0.0206	-0.0206	-0.0180	0.0221	0.0221	-0.0018
	p-value	(0.9060)	(0.9180)	(0.1520)	(0.3640)	(0.1970)	(0.0420)	(0.3750)	(0.4130)	(0.8460)
Maturity	B	0.1810**	0.1810**	-0.0555*	0.1353**	0.1353**	-0.0001	-0.0150	-0.0150	-0.0301
	β	0.0887**	0.0887**	-0.0272*	0.1035**	0.1035**	-0.0001	-0.0100	-0.0100	-0.0199
	p-value	(0.0390)	(0.0470)	(0.0910)	(0.0160)	(0.0130)	(0.9970)	(0.8250)	(0.8200)	(0.1010)
%Equity	B	-0.0171	-0.0171*	0.0041	0.0025	0.0025*	0.0093***	-0.0166*	-0.0166*	-0.0031
	β	-0.1131	-0.1131*	0.0268	0.0253	0.0253*	0.0960***	-0.1484*	-0.1484*	-0.0281
	p-value	(0.1330)	(0.0550)	(0.2080)	(0.6060)	(0.0870)	0.0000	(0.0690)	(0.0550)	(0.1200)
Single-scheme	B	-0.8129	-0.8129	0.2336	-0.6083**	-0.6083***	-0.4142***	-0.0575	-0.0575	0.5020***
	β	-0.2664	-0.2664	0.0766	-0.3111**	-0.3111***	-0.2118***	-0.0255	-0.0255	0.2225***
	p-value	(0.2040)	(0.3250)	(0.1790)	(0.0240)	(0.0100)	0.0000	(0.9120)	(0.9350)	(0.0010)
%FR	B	0.0132	0.0132	-0.0086**	-0.0115*	-0.0115*	-0.0091***	0.0244**	0.0244	0.0003
	β	0.0617	0.0617	-0.0401**	-0.0837*	-0.0837*	-0.0663***	0.1536**	0.1536	0.0020
	p-value	(0.3050)	(0.4000)	(0.0440)	(0.0610)	(0.0640)	0.0000	(0.0430)	(0.1640)	(0.9170)
_cons	B	-4.4822	-4.4822	3.7530***	-1.1172	-1.1172	1.1162***	-3.3867	-3.3867	2.1182***
	p-value	(0.2310)	(0.2920)	0.0000	(0.5710)	(0.2460)	(0.0030)	(0.1730)	(0.3780)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
		146	146	145	146	146	145	146	146	145
F-stat		7.18	735.61		8.23	2313.31		3.21	1675.81	
Wald chi				598.54			1414.78			246.64
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
within		0.1446	0.1446		0.2194	0.2194		0.0624	0.0624	
between		0.0029			0.0829			0.019		
overall		0.0173			0.1308			0.0005		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.14

Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-TA-Industry	B	-0.0062	-0.0062	-0.0118***	-0.0014	-0.0014	-0.0042**	-0.0094	-0.0094	-0.0056*
	ß	-0.0438	-0.0438	-0.0840***	-0.0153	-0.0153	-0.0468**	-0.0901	-0.0901	-0.0541*
	p-value	(0.6150)	(0.5520)	(0.0020)	(0.8060)	(0.6440)	(0.0410)	(0.3070)	(0.1990)	(0.0520)
Dividends	B	0.0572*	0.0572***	0.0340***	0.0145	0.0145	0.0027	0.0310**	0.0310**	0.0320***
	ß	0.0971*	0.0971***	0.0578***	0.0383	0.0383	0.0072	0.0711**	0.0711**	0.0735***
	p-value	(0.0900)	0.0000	(0.0070)	(0.4710)	(0.1250)	(0.5640)	(0.0330)	(0.0340)	0.0000
Debt-to-TA-Industry*Dividends	B	-0.0018	-0.0018***	-0.0011*	-0.0013*	-0.0013***	-0.0006**	0.0001	0.0001	-0.0003
	ß	-0.0816	-0.0816***	-0.0489*	-0.0959*	-0.0959***	-0.0432**	0.0082	0.0082	-0.0173
	p-value	(0.1740)	(0.0010)	(0.0820)	(0.0870)	(0.0010)	(0.0280)	(0.8150)	(0.6290)	(0.4500)
Ln (Company-size)	B	0.6967*	0.6967*	-0.0844	0.3871	0.3871***	0.1492***	0.3311	0.3311	-0.1476***
	ß	0.4197*	0.4197*	-0.0508	0.3638	0.3638***	0.1403***	0.2696	0.2696	-0.1202***
	p-value	(0.0890)	(0.0860)	(0.1160)	(0.1050)	(0.0080)	0.0000	(0.2100)	(0.3230)	(0.0010)
Profitability	B	-0.0157	-0.0157	-0.0006	0.0006	0.0006	-0.0032	-0.0070	-0.0070	-0.0033
	ß	-0.0343	-0.0343	-0.0012	0.0019	0.0019	-0.0108	-0.0208	-0.0208	-0.0097
	p-value	(0.3870)	(0.4810)	(0.9390)	(0.9500)	(0.9570)	(0.3950)	(0.6450)	(0.6950)	(0.5100)
Cash	B	0.0254	0.0254*	0.0193**	0.0292***	0.0292***	0.0164***	-0.0090	-0.0090	-0.0055
	ß	0.0537	0.0537*	0.0408**	0.0964***	0.0964***	0.0542***	-0.0259	-0.0259	-0.0157
	p-value	(0.1330)	(0.0920)	(0.0230)	(0.0040)	(0.0090)	0.0000	(0.5260)	(0.3740)	(0.3080)
Closure-to-FA	B	0.0798	0.0798**	-0.0787**	0.0237	0.0237	-0.1358***	0.0479	0.0479**	0.0051
	ß	0.0579	0.0579**	-0.0571**	0.0269	0.0269	-0.1536***	0.0470	0.0470**	0.0050
	p-value	(0.3530)	(0.0500)	(0.0350)	(0.6320)	(0.4020)	0.0000	(0.4600)	(0.0170)	(0.8470)
Scheme-returns	B	-0.0039	-0.0039	-0.0072**	-0.0052	-0.0052	-0.0045**	0.0036	0.0036	-0.0012
	ß	-0.0123	-0.0123	-0.0228**	-0.0255	-0.0255	-0.0220**	0.0156	0.0156	-0.0052
	p-value	(0.6490)	(0.6770)	(0.0440)	(0.2670)	(0.1210)	(0.0130)	(0.5310)	(0.5700)	(0.5770)
Maturity	B	0.1663*	0.1663**	-0.0391	0.1387**	0.1387**	-0.0049	-0.0347	-0.0347	-0.0354*
	ß	0.0815*	0.0815**	-0.0192	0.1061**	0.1061**	-0.0037	-0.0230	-0.0230	-0.0234*
	p-value	(0.0550)	(0.0480)	(0.2380)	(0.0130)	(0.0150)	(0.8030)	(0.6090)	(0.5750)	(0.0710)
%Equity	B	-0.0163	-0.0163*	0.0031	0.0028	0.0028**	0.0092***	-0.0162*	-0.0162*	-0.0033*
	ß	-0.1079	-0.1079*	0.0207	0.0288	0.0288**	0.0952***	-0.1450*	-0.1450*	-0.0292*
	p-value	(0.1500)	(0.0680)	(0.3170)	(0.5560)	(0.0470)	0.0000	(0.0760)	(0.0620)	(0.0950)
Single-scheme	B	-0.6913	-0.6913	0.1966	-0.5957**	-0.5957***	-0.3937***	0.0376	0.0376	0.5106***
	ß	-0.2266	-0.2266	0.0644	-0.3046**	-0.3046***	-0.2013***	0.0167	0.0167	0.2263***
	p-value	(0.2970)	(0.4240)	(0.2750)	(0.0370)	(0.0060)	0.0000	(0.9410)	(0.9580)	(0.0010)
%FR	B	0.0159	0.0159	-0.0083*	-0.0116*	-0.0116*	-0.0101***	0.0267**	0.0267	0.0003
	ß	0.0741	0.0741	-0.0387*	-0.0846*	-0.0846*	-0.0731***	0.1680**	0.1680	0.0021
	p-value	(0.2290)	(0.3440)	(0.0660)	(0.0640)	(0.0520)	0.0000	(0.0300)	(0.1510)	(0.9160)
_cons	B	-2.4817	-2.4817	4.8570***	-0.2775	-0.2775	1.6551***	-2.3471	-2.3471	2.5679***
	p-value	(0.4960)	(0.5310)	0.0000	(0.8920)	(0.8000)	0.0000	(0.3390)	(0.5230)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
		146	146	145	146	146	145	146	146	145
F-stat		6.3	233.29		9.16	5083.67		2.94	146.18	
Wald chi				447.34			2054.9			216.2
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
within		0.131	0.131		0.2229	0.2229		0.0519	0.0519	
between		0.0047			0.0802			0.0103		
overall		0.0152			0.1315			0.0011		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.15
Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs*. All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-TA-Year	B	-0.0070	-0.0070	-0.0146***	-0.0008	-0.0008	-0.0041**	-0.0105	-0.0105	-0.0069**
	B	-0.0539	-0.0539	-0.1130***	-0.0093	-0.0093	-0.0489**	-0.1100	-0.1100	-0.0722**
	p-value	(0.5640)	(0.4790)	0.0000	(0.8870)	(0.7720)	(0.0450)	(0.2520)	(0.1360)	(0.0180)
Dividends	B	0.0446	0.0446***	0.0213*	0.0087	0.0087	-0.0008	0.0278**	0.0278**	0.0277***
	B	0.0758	0.0758***	0.0362*	0.0231	0.0231	-0.0020	0.0638**	0.0638**	0.0635***
	p-value	(0.1260)	0.0000	(0.0530)	(0.5910)	(0.2100)	(0.8490)	(0.0230)	(0.0270)	0.0000
Debt-to-TA-Year*Dividends	B	-0.0013	-0.0013***	-0.0003	-0.0012*	-0.0012***	-0.0005**	0.0004	0.0004*	0.0001
	B	-0.0586	-0.0586***	-0.0124	-0.0878*	-0.0878***	-0.0380**	0.0239	0.0239*	0.0092
	p-value	(0.2720)	(0.0010)	(0.6090)	(0.0590)	0.0000	(0.0230)	(0.4720)	(0.0590)	(0.6800)
Ln (Company-size)	B	0.7078*	0.7078*	-0.0798	0.3933*	0.3933***	0.1498***	0.3322	0.3322	-0.1445***
	ß	0.4263*	0.4263*	-0.0481	0.3696*	0.3696***	0.1408***	0.2705	0.2705	-0.1177***
	p-value	(0.0850)	(0.0810)	(0.1360)	(0.0990)	(0.0060)	0.0000	(0.2090)	(0.3230)	(0.0020)
Profitability	B	-0.0130	-0.0130	0.0005	0.0007	0.0007	-0.0030	-0.0052	-0.0052	-0.0025
	ß	-0.0283	-0.0283	0.0012	0.0024	0.0024	-0.0103	-0.0153	-0.0153	-0.0074
	p-value	(0.4730)	(0.5520)	(0.9390)	(0.9340)	(0.9450)	(0.4160)	(0.7370)	(0.7700)	(0.6180)
Cash	B	0.0260	0.0260*	0.0186**	0.0295***	0.0295***	0.0163***	-0.0090	-0.0090	-0.0055
	ß	0.0549	0.0549*	0.0394**	0.0974***	0.0974***	0.0538***	-0.0256	-0.0256	-0.0157
	p-value	(0.1310)	(0.0980)	(0.0290)	(0.0040)	(0.0100)	0.0000	(0.5300)	(0.3780)	(0.3110)
Closure-to-FA	B	0.0831	0.0831**	-0.0769**	0.0259	0.0259	-0.1332***	0.0481	0.0481**	0.0065
	ß	0.0603	0.0603**	-0.0558**	0.0293	0.0293	-0.1507***	0.0472	0.0472**	0.0064
	p-value	(0.3330)	(0.0440)	(0.0380)	(0.6010)	(0.3620)	0.0000	(0.4590)	(0.0180)	(0.8050)
Scheme-returns	B	-0.0035	-0.0035	-0.0065*	-0.0050	-0.0050	-0.0041**	0.0040	0.0040	-0.0011
	ß	-0.0110	-0.0110	-0.0206*	-0.0249	-0.0249	-0.0203**	0.0172	0.0172	-0.0047
	p-value	(0.6880)	(0.7150)	(0.0690)	(0.2780)	(0.1320)	(0.0220)	(0.4940)	(0.5420)	(0.6210)
Maturity	B	0.1611*	0.1611**	-0.0411	0.1367**	0.1367**	-0.0044	-0.0365	-0.0365	-0.0356*
	ß	0.0790*	0.0790**	-0.0202	0.1046**	0.1046**	-0.0033	-0.0242	-0.0242	-0.0236*
	p-value	(0.0640)	(0.0490)	(0.2190)	(0.0150)	(0.0140)	(0.8230)	(0.5890)	(0.5570)	(0.0700)
%Equity	B	-0.0165	-0.0165*	0.0032	0.0026	0.0026*	0.0092***	-0.0162*	-0.0162*	-0.0035*
	ß	-0.1092	-0.1092*	0.0213	0.0273	0.0273*	0.0948***	-0.1449*	-0.1449*	-0.0316*
	p-value	(0.1470)	(0.0670)	(0.2940)	(0.5770)	(0.0550)	0.0000	(0.0760)	(0.0620)	(0.0730)
Single-scheme	B	-0.6826	-0.6826	0.2075	-0.5929**	-0.5929***	-0.3932***	0.0411	0.0411	0.5264***
	ß	-0.2237	-0.2237	0.0680	-0.3032**	-0.3032***	-0.2011***	0.0182	0.0182	0.2333***
	p-value	(0.2990)	(0.4270)	(0.2460)	(0.0380)	(0.0050)	0.0000	(0.9360)	(0.9540)	(0.0010)
%FR	B	0.0164	0.0164	-0.0084*	-0.0113*	-0.0113*	-0.0100***	0.0267**	0.0267	0.0003
	ß	0.0764	0.0764	-0.0391*	-0.0824*	-0.0824*	-0.0730***	0.1683**	0.1683	0.0019
	p-value	(0.2140)	(0.3290)	(0.0620)	(0.0700)	(0.0590)	0.0000	(0.0300)	(0.1510)	(0.9210)
_cons	B	-2.6228	-2.6228	4.6817***	-0.3386	-0.3386	1.5837***	-2.4047	-2.4047	2.4895***
	p-value	(0.4720)	(0.5040)	0.0000	(0.8680)	(0.7550)	0.0000	(0.3280)	(0.5120)	0.0000
Number of obs		1,403	1403	1,402	1,403	1403	1,402	1,403	1403	1,402
		146	146	145	146	146	145	146	146	145
F-stat		6.58	1121.78		9.4	2240.87		2.99	150.37	
Wald chi				464.79			2197			216.34
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Within		0.1296	0.1296		0.2226	0.2226		0.0523	0.0523	
Between		0.0052			0.0815			0.0117		
Overall		0.0143			0.1323			0.0008		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.16

Regressions of *TOTAL-*, *REGULAR-* contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-MC	B	-0.0280***	-0.0280**	-0.0150***	-0.0086*	-0.0086**	-0.0108***	-0.0174**	-0.0174**	-0.0071***
	ß	-0.2054***	-0.2054**	-0.1102***	-0.0981*	-0.0981**	-0.1238***	-0.1729**	-0.1729**	-0.0703***
	p-value	(0.0030)	(0.0190)	0.0000	(0.0770)	(0.0500)	0.0000	(0.0340)	(0.0270)	(0.0080)
Ln (Company-size)	B	0.7828***	0.7828**	0.0171	0.3013*	0.3013***	0.1131***	0.4603***	0.4603	-0.0458
	ß	0.4715***	0.4715**	0.0103	0.2832*	0.2832***	0.1063***	0.3749***	0.3749	-0.0373
	p-value	(0.0040)	(0.0440)	(0.7050)	(0.0780)	0.0000	0.0000	(0.0090)	(0.1080)	(0.2670)
Profitability	B	0.0134	0.0134	0.0046	0.0126*	0.0126**	0.0050	0.0013	0.0013	0.0016
	ß	0.0292	0.0292	0.0100	0.0431*	0.0431**	0.0172	0.0037	0.0037	0.0048
	p-value	(0.4210)	(0.2110)	(0.5110)	(0.0660)	(0.0480)	(0.1480)	(0.9280)	(0.9070)	(0.6860)
Dividends	B	0.0398*	0.0398***	0.0244***	-0.0049	-0.0049	-0.0031	0.0413***	0.0413***	0.0315***
	ß	0.0676*	0.0676***	0.0414***	-0.0131	-0.0131	-0.0082	0.0948***	0.0948***	0.0723***
	p-value	(0.0620)	(0.0040)	(0.0100)	(0.6860)	(0.2040)	(0.3650)	0.0000	(0.0090)	0.0000
Cash	B	0.0208	0.0208	0.0197**	0.0210**	0.0210*	0.0138***	-0.0061	-0.0061	-0.0037
	ß	0.0440	0.0440	0.0416**	0.0694**	0.0694*	0.0457***	-0.0173	-0.0173	-0.0106
	p-value	(0.2430)	(0.1590)	(0.0170)	(0.0500)	(0.0870)	0.0000	(0.6510)	(0.5090)	(0.4710)
Closure-to-FA	B	0.0721	0.0721**	-0.0248	-0.0109	-0.0109	-0.1253***	0.0759	0.0759***	0.0422*
	ß	0.0523	0.0523**	-0.0180	-0.0123	-0.0123	-0.1418***	0.0744	0.0744***	0.0414*
	p-value	(0.3360)	(0.0250)	(0.4590)	(0.8310)	(0.5820)	0.0000	(0.2480)	(0.0100)	(0.0830)
Scheme-returns	B	-0.0061	-0.0061	-0.0067**	-0.0062	-0.0062	-0.0040**	0.0023	0.0023	-0.0017
	ß	-0.0194	-0.0194	-0.0213**	-0.0309	-0.0309	-0.0197**	0.0100	0.0100	-0.0073
	p-value	(0.4370)	(0.5420)	(0.0500)	(0.1650)	(0.1460)	(0.0190)	(0.6670)	(0.6780)	(0.4260)
Maturity	B	0.1023	0.1023	-0.0701**	0.1034*	0.1034*	-0.0031	-0.0464	-0.0464	-0.0362**
	ß	0.0502	0.0502	-0.0344**	0.0791*	0.0791*	-0.0024	-0.0308	-0.0308	-0.0240**
	p-value	(0.2410)	(0.2760)	(0.0300)	(0.0570)	(0.0980)	(0.8660)	(0.4190)	(0.4270)	(0.0440)
%Equity	B	-0.0169*	-0.0169**	0.0037	0.0023	0.0023	0.0110***	-0.0160*	-0.0160*	-0.0046**
	ß	-0.1117*	-0.1117**	0.0245	0.0240	0.0240	0.1132***	-0.1427*	-0.1427*	-0.0415**
	p-value	(0.1000)	(0.0270)	(0.2190)	(0.6290)	(0.3500)	0.0000	(0.0580)	(0.0620)	(0.0140)
Single-scheme	B	-0.6073	-0.6073	0.2925*	-0.4655*	-0.4655**	-0.3431***	-0.0274	-0.0274	0.4337***
	ß	-0.1991	-0.1991	0.0959*	-0.2381*	-0.2381**	-0.1755***	-0.0122	-0.0122	0.1922***
	p-value	(0.3080)	(0.4170)	(0.0710)	(0.0950)	(0.0450)	0.0000	(0.9570)	(0.9670)	(0.0030)
%FR	B	0.0186	0.0186	-0.0090**	-0.0105*	-0.0105*	-0.0086***	0.0275**	0.0275*	0.0007
	ß	0.0904	0.0904	-0.0436**	-0.0799*	-0.0799*	-0.0653***	0.1810**	0.1810*	0.0044
	p-value	(0.1440)	(0.1870)	(0.0230)	(0.0610)	(0.0720)	0.0000	(0.0180)	(0.0640)	(0.8300)
_cons	B	-2.1595	-2.1595	4.6582***	0.7762	0.7762	2.1304***	-2.7902*	-2.7902	2.1741***
	p-value	(0.3800)	(0.4890)	0.0000	(0.6000)	(0.2350)	0.0000	(0.0740)	(0.3210)	0.0000
Number of obs		1,567	1567	1,566	1,567	1567	1,566	1,567	1567	1,566
Number of companies		163	163	162	163	163	162	163	163	162
F-stat		8.21	252.24		9.38	404.57		3.44	14848.86	
Wald chi				1425.65			1327.66			204.58
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Within		0.1374	0.1374		0.2113	0.2113		0.0605	0.0605	
Between		0.0048			0.0631			0.0129		
Overall		0.0192			0.1251			0.0011		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

Table 6.17

Regressions of *TOTAL*-, *REGULAR*- contributions and *DRCs.* All variables are defined in Table 6.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Table reports both unstandardized (B) and standardised coefficients (β).

Dependent variable		TOTAL-contributions			REGULAR-contributions			DRCs		
		FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS	FE cluster	Driscoll-Kraay	FGLS
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Debt-to-TA	B	-0.0198**	-0.0198***	-0.0160***	-0.0044	-0.0044	-0.0072***	-0.0142*	-0.0142***	-0.0054**
	β	-0.1310**	-0.1310***	-0.1060***	-0.0450	-0.0450	-0.0746***	-0.1276*	-0.1276***	-0.0482**
	p-value	(0.0370)	(0.0090)	0.0000	(0.3510)	(0.2580)	0.0000	(0.0690)	(0.0070)	(0.0400)
Ln (Company-size)	B	0.5888**	0.5888**	-0.0389	0.2334	0.2334***	0.0599**	0.3493**	0.3493	-0.0691*
	β	0.3546**	0.3546**	-0.0234	0.2193	0.2193***	0.0563**	0.2845**	0.2845	-0.0563*
	p-value	(0.0330)	(0.0210)	(0.3750)	(0.1850)	(0.0010)	(0.0390)	(0.0280)	(0.1100)	(0.0820)
Profitability	B	0.0010	0.0010	-0.0031	0.0084	0.0084	-0.0019	-0.0059	-0.0059	-0.0023
	β	0.0022	0.0022	-0.0067	0.0287	0.0287	-0.0066	-0.0175	-0.0175	-0.0068
	p-value	(0.9480)	(0.9440)	(0.6330)	(0.1660)	(0.1350)	(0.5380)	(0.6290)	(0.6780)	(0.5320)
Dividends	B	0.0327*	0.0327***	0.0221**	-0.0073	-0.0073	-0.0055*	0.0370***	0.0370***	0.0293***
	β	0.0554*	0.0554***	0.0375**	-0.0193	-0.0193	-0.0147*	0.0850***	0.0850***	0.0673***
	p-value	(0.0890)	(0.0010)	(0.0150)	(0.5290)	(0.1260)	(0.0960)	0.0000	(0.0060)	0.0000
Cash	B	0.0208	0.0208	0.0212***	0.0212**	0.0212*	0.0147***	-0.0063	-0.0063	-0.0026
	β	0.0440	0.0440	0.0448***	0.0702**	0.0702*	0.0485***	-0.0180	-0.0180	-0.0076
	p-value	(0.2420)	(0.1800)	(0.0100)	(0.0460)	(0.0970)	0.0000	(0.6370)	(0.5040)	(0.5980)
Closure-to-FA	B	0.0821	0.0821**	-0.0286	-0.0078	-0.0078	-0.1310***	0.0820	0.0820***	0.0460*
	β	0.0596	0.0596**	-0.0208	-0.0089	-0.0089	-0.1483***	0.0805	0.0805***	0.0451*
	p-value	(0.2700)	(0.0130)	(0.3930)	(0.8760)	(0.7090)	0.0000	(0.2110)	(0.0020)	(0.0550)
Scheme-returns	B	-0.0044	-0.0044	-0.0066*	-0.0057	-0.0057	-0.0033**	0.0034	0.0034	-0.0010
	β	-0.0139	-0.0139	-0.0210*	-0.0281	-0.0281	-0.0163**	0.0145	0.0145	-0.0044
	p-value	(0.5880)	(0.6920)	(0.0520)	(0.2110)	(0.2150)	(0.0490)	(0.5360)	(0.5670)	(0.6140)
Maturity	B	0.0886	0.0886	-0.0599*	0.0991*	0.0991	-0.0041	-0.0549	-0.0549	-0.0340*
	β	0.0434	0.0434	-0.0294*	0.0758*	0.0758	-0.0031	-0.0364	-0.0364	-0.0225*
	p-value	(0.3070)	(0.3390)	(0.0630)	(0.0680)	(0.1050)	(0.8250)	(0.3360)	(0.3450)	(0.0590)
%Equity	B	-0.0167	-0.0167**	0.0035	0.0024	0.0024	0.0111***	-0.0159*	-0.0159*	-0.0036**
	β	-0.1104	-0.1104**	0.0231	0.0248	0.0248	0.1146***	-0.1418*	-0.1418*	-0.0323**
	p-value	(0.1050)	(0.0300)	(0.2400)	(0.6180)	(0.3220)	0.0000	(0.0600)	(0.0660)	(0.0340)
Single-scheme	B	-0.5832	-0.5832	0.3163**	-0.4543	-0.4543**	-0.2837***	-0.0168	-0.0168	0.3763***
	β	-0.1912	-0.1912	0.1037**	-0.2323	-0.2323**	-0.1451***	-0.0075	-0.0075	0.1668***
	p-value	(0.3420)	(0.4530)	(0.0470)	(0.1140)	(0.0380)	(0.0010)	(0.9740)	(0.9810)	(0.0090)
%FR	B	0.0181	0.0181	-0.0078**	-0.0105*	-0.0105*	-0.0087***	0.0271**	0.0271*	0.0004
	β	0.0883	0.0883	-0.0381**	-0.0798*	-0.0798*	-0.0664***	0.1782**	0.1782*	0.0029
	p-value	(0.1570)	(0.2080)	(0.0500)	(0.0630)	(0.0550)	0.0000	(0.0200)	(0.0740)	(0.8840)
_cons	B	-0.4877	-0.4877	5.4258***	1.2379	1.2379*	2.5603***	-1.6925	-1.6925	2.3369***
	p-value	(0.8490)	(0.8570)	0.0000	(0.4340)	(0.0620)	0.0000	(0.2770)	(0.5030)	0.0000
Number of obs		1,567	1567	1,566	1,567	1567	1,566	1,567	1567	1,566
Number of companies		163	163	162	163	163	162	163	163	162
F-stat		8.1	2232.94		9.16	1215.48		3.62	18592.14	
Wald chi				1567.52			1901.99			207.8
Prob>F		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Within		0.1339	0.1339		0.2094	0.2094		0.0589	0.0589	
Between		0.0048			0.0639			0.0067		
Overall		0.0217			0.1265			0.0024		
Year effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects		No	No	Yes	No	No	Yes	No	No	Yes

6.5. Conclusion

High debt in the corporate structure can make it more difficult and more costly to raise new funds. As a result, companies may seek to reduce pension contributions because pension contributions significantly reduce cash. However, studies for US and Dutch companies provide opposing effects of debt on funding policy of DB schemes. This study examines the effects of debt on funding policy of DB schemes sponsored by British companies. While prior studies do not discuss the role of pension regulation in funding policy of DB schemes, this study argues that regulation can influence the way how companies fund their pension schemes. Hypothesising that British companies more likely to reduce pension contributions when the debt is high due to less strict regulation, this study provides plausible results for this hypothesis. In particular, this study finds that companies with high debt relative to market capitalisation and total assets reduce regular pension contributions which companies make to cover the annual cost of pensions and additional pension contributions which companies make to reduce the deficit. These findings have important implications for DB schemes because they provide useful insights regarding the effectiveness of the Pension Act of 2004. Managing regular pension contributions can harm the pension scheme members as it not only increases the likelihood of default but also lowers the amount of pension assets. In particular, making lower regular contributions would increase the deficit in DB schemes because the reduction in regular contributions is driven by the company's need for a higher cash and not by the lower cost of DB pensions. Second, DRCs may be less effective at reducing the deficit if the company also reduces regular contributions. This can explain why the deficit in DB schemes in some companies grows despite having paid DRCs (e.g., Carillion, BHS). Therefore, these findings reveal important implications for the management of DB schemes, which might also be of interests to pension regulators who may consider improving the existing pension regulation.

On a more general note, this study findings highlight that companies are motivated to transfer wealth from debt to equity holders when the risk is high. Moreover, the obtained findings also suggest that pension contributions are influenced by the dividend policy. In particular, companies tend to increase additional contributions toward deficit reduction when companies also pay higher dividends. This finding is in line with prior studies of Bunn, Mizen and Smietanka (2018) and Liu and Tonks (2012). However, the interaction effect of debt and dividends suggest that high debt-financed companies tend to engage in risk-shifting strategies by transferring wealth from pensions scheme members to equity holders.

Conclusion

This thesis had four main objectives. The first objective was to investigate the relationship between CEO inside debt incentives generated by DB pensions and the funding of DB pension schemes. The second objective was to examine whether CFO inside debt incentives also matter for the funding of DB pension schemes. The third objective was to explore whether inside debt incentives of CEOs and CFOs are related to the funding policy of deficit of DB pension schemes. The last objective was to examine whether companies with DB pension arrangements reduce pension contributions when they are financially constrained.

The first objective was addressed in Chapter 4. The analysis showed that CEO inside debt incentives are associated with higher funding of DB pension schemes. These results suggest that DB pension schemes are better funded when CEO participates in a DB scheme, e.g., when he has a DB pension. The results also show that CEO DB pensions are more strongly related to the funding of pension schemes in companies with single-schemes. This finding suggests that the CEO cares more about the scheme in which he participates and less about other schemes. The analysis also shows that funding of DB schemes negatively related to short career horizon, suggesting that CEOs start to behave myopically as they get closer to retirement. However, DB pensions induce CEOs with short career horizon to look better after the pension scheme to ensure of getting the promised level of pensions.

The second objective was addressed in Chapter 5. The analysis reveals that CFO inside debt incentives are not associated with higher funding of DB pension schemes. This suggests that CFOs incentives are less influential than those of CEOs. Although CFO is in charge of financials, it appears that CEOs might exert significant influence over CFOs decisions to induce CFOs to make decisions to regard the interests of CEOs which are not always in interests of CFOs themselves. This may also explain why DB schemes are found to be associated with higher DB pension schemes only when CEO participates in DB schemes.

The third objective was addressed in Chapter 6. The analysis showed that only companies whose CEOs participate in DB schemes are associated with a higher probability of making DRCs. These findings suggest that a company is more likely to make additional contributions to reduce the deficit when the CEO has a DB pension. However, the analysis fails to find any relationship between companies whose CFOs participate in DB schemes and the probability of making DRCs. This finding provides further assurance that CEOs inside-debt incentives are more influential than those of CFOs. The analysis also reveals that the probability of making DRCs increases as CEO gets closer to retirement. This suggests that CEOs tend to initiate decisions to reduce the riskiness of the pension scheme to protect pension accruals.

The fourth and last objective of this thesis is addressed in Chapter 7. The analysis shows that high-debt companies are associated with lower regular pension contributions and DRCs. This implies that companies tend to reduce both types of pension contributions when they are financially constrained. This study further documents that while dividends alone positively associated with pension contributions, it has been found that companies with high debt and high dividend payouts are associated with lower pension contributions. These findings suggest that risky companies act in the interests of their shareholders as they tend to transfer wealth from the pension scheme members to shareholders by increasing dividends and reducing the pension contributions to DB schemes. This harms pension scheme members as it increases the likelihood of the pension scheme default.

This thesis makes several contributions. First, this thesis contributes to the literature on corporate DB pension schemes. In particular, it provides empirical evidence on whether inside-debt incentives are important for the deficit funding approaches of DB schemes. Second, it contributes to the limited literature on the role of CFO inside debt incentives. Third, this research establishes whether DRCs are effective at reducing the deficit. Fourth, this thesis contributes to the literature by examining the impact of debt in the corporate structure of companies on pension contributions. It is worth noting that this thesis is the first that examines different types of pension contributions – regular pension contributions and DRCs. These contributions differ significantly in their stated objectives, and thus it is important to understand the impact of debt on both - regular pension contributions and DRCs. Overall, this thesis contributes to a better understanding of the factors that influence the funding positions of DB schemes. The limited empirical evidence on corporate DB schemes in the UK makes this thesis's findings particularly valuable to the pension regulators, policymakers and the boards who can improve the management of DB schemes and prevent the schemes from being underfunded. Apart from this, this study also contributes to the literature on the usefulness of inside debt at reducing the risk inducing effects and the role of CEOs and CFOs in the company setting.

Limitations and avenues for future research

This thesis has potential limitations. A major concern is the causal interpretation of the relation between CEO DB pension holdings and the funding levels of DB pension schemes is the endogeneity problem. The endogeneity problem arises from four sources. The first is omitted variables, which refers to variables that are likely to affect the funding levels of DB pension schemes and should be included in the set of explanatory variables, but they are not because they are not directly observable. The second is simultaneity or reverse causality, which occurs when it can be argued that either independent variable causes the dependent variable to change or that dependent variable causes the independent variable to change. For example, in the context of the study presented in Chapter 4, it is argued that CEO incentives affect the funding level of DB schemes, but causality can run the other way. For example, it is likely that a certain funding levels of the DB scheme may encourage the company to retain open DB pension schemes that may encourage CEOs to accept a certain compensation package that includes DB pension benefits. The third source of endogeneity problem is a measurement error. Measurement error arises when variables used in the study are measured imperfectly because they are not directly observable and hence, they are difficult to quantify (such as the retirement age of CEO). To address the potential endogeneity concerns, it will be useful to provide evidence-based on an instrumental variable. For this approach, an instrumental variable is needed that is correlated with the CEO DB pension holdings and has no direct effect on the funding levels.

The fourth source of endogeneity is related to CEO ownership. The obtained findings suggest that CEOs significantly influence the funding levels of DB pension schemes. One potential concern with this interpretation, however, is that there might be several companies in the sample in which the decision-making power is centralized in the hands of CEOs with high ownership that may also encourage the CEO to reduce any deficit. For example, high CEO ownership may also encourage the CEO to reduce the deficit (e.g. to avoid criticism by the press, stock market pressure and decline in wealth). To the contrary, a high level of option-like holdings may encourage excessive risk-taking and hence a corporate strategy that supports a large deficit. If the sample includes a large number of companies whose CEOs have high ownership, this undermines the findings of the important role played by CEOs. To address this issue, it will be useful to control for the number of shares owned by the CEO and the amount of options or LTIPS held by the CEO to ensure the robustness of the findings.

The research presented in this thesis can also be extended in at least in two ways. For example, the study can be extended by addressing the question of how CFO matter to corporate financial policies of DB pension schemes. The obtained findings suggest that CFOs do not influence the funding levels of DB pension schemes. One potential concern with this interpretation, however, is that there might be several companies in the sample in which the decision-making power is centralized in the hands of powerful CEOs (Adams et al., 2005), who make most of the major decisions. However, the degree to which a CEO retains formal decision-making authority and delegates the real decision-making control over to other top executives − such as the CFO − depends on firm characteristics such as the size and complexity of operations, and the CEO's knowledge of a given policy (Graham et al. (2015)). Therefore, to address the question of how CFO matter to corporate financial policies of DB pension schemes, the future research can draw on studies that aim to conceptualize and measure the power and influence of boards and their directors (see e.g., Florackis and Sainani, 2018). To capture the capacity of the CFO to exert influence over corporate decisions, it might be useful to identify conditions under which CFOs more likely to matter and construct proxies of CEO & CFO incentives and proxies of CEO & CFO power in order to be able to capture the ability of the CFO to influence key financial policies (Florackis and Sainani, 2018; Finkelstein, 1992).

The study presented in the last empirical chapter that examines the relationship between contribution policies and the corporate structure can be extended by considering the role of CEO and potentially CFO. In particular, it might be useful to perform subsample analysis to investigate the extent to which the capital structure influences the contribution policy of DB pension schemes when CEO and CFO have DB pension holdings. Based on the CEO hypothesis discussed in Chapter 4, one would expect the negative effect of the debt on contribution policies of DB pension schemes to be less pronounced (if at all) for companies whose CEOs are DB members.

The last empirical research can also be extended by the construction of an index of financially constrained companies based on other company-specific characteristics other than debt. With this respect, the future research can be drawn on studies that aim to conceptualize and measure the influence of other measures that best proxy for financial constraints (such as annual-payout ratio, debt-rating, paper-rating (see e.g., Denis and Siblikov, 2009).

On a more general note, there is a need to understand the sources through which companies reduce their pension contributions. In particular, while one side of the story says that companies tend to reduce pension contributions when they are financially constrained, from the other side, it is yet unclear how companies reduce their pension contributions to DB schemes. Precisely, there is no clear evidence in the literature concerning what financially constrained companies do to reduce their pension contributions. To investigate the channels through which financially constrained companies to manage contributions is important because companies are not expected to pay lower contributions when they wish to do so, and accurate level of contributions are vital to maintaining the financial health of DB schemes. However, companies may manage pension assumptions to lower the cost of DB pensions, and the future research may fall within the area of pension assumptions to contribute to the knowledge about the complex nature of DB pension schemes.

APPENDIX

Table 4.6
FGLS results for funding of DB schemes (*%FR*)

This tables reports results from FGLS regressions on whether CEO DB pension holdings are related to the dependent variable, Funding Ratio, which is defined as the ratio of pension assets to the value of pension liabilities. Panel A reports results from regressions including a two-way interaction term and Panel B reports results from regressions including a three-way interaction term. Models 1 to 3 include a two-way interaction Annual-pension*aboveCAP-member and Models 4 to 6 include a two-way interaction Total-pension*aboveCAP-member. Models 7 to 9 include a three-way interaction Annual-pension*aboveCAP-member*Single-scheme and Models 10 to 12 include a three-way interaction Total-pension*aboveCAP-member*Single-scheme. Regressions reported in this table control for Company-tenure. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A:

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Annual-pension			Total-pension		
CEO-DB-pension	-1.041***		-1.359***	-0.052**		-0.087***
	(0.002)		(0.000)	(0.045)		(0.000)
CEO-aboveCAP-member	-3.349***		-3.979***	-3.285***		-3.831***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	1.116***		1.459***	0.056**		0.089***
	(0.001)		(0.000)	(0.031)		(0.000)
Single-scheme	4.160***	4.596***	3.785***	4.245***	5.162***	3.946***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (CEO-Company-tenure)	-0.070		0.052	0.327		0.359
	(0.825)		(0.874)	(0.255)		(0.247)
Accounting-background	-0.275		-0.273	0.184		-0.036
	(0.684)		(0.708)	(0.768)		(0.958)
CFO-DB-pension		0.146	0.105		0.028	0.013
		(0.427)	(0.593)		(0.107)	(0.365)
CFO-aboveCAP		0.946	1.172*		1.324*	2.360***
		(0.149)	(0.080)		(0.072)	(0.001)
CFO-DB-pension*CFO-aboveCAP-member		-0.229	-0.195		-0.035**	-0.022
		(0.228)	(0.337)		(0.047)	(0.127)
ln (CFO-Company-tenure)		-0.472*	-0.436		-0.435	-0.568*
		(0.100)	(0.134)		(0.138)	(0.060)
%Equity	-0.107***	-0.107***	-0.109***	-0.106***	-0.114***	-0.116***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.450***	-0.292*	-0.444***	-0.494***	-0.371**	-0.492***
	(0.006)	(0.051)	(0.004)	(0.002)	(0.016)	(0.001)
Maturity	0.566***	0.596***	0.526***	0.663***	0.630***	0.648***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.016	-0.258	-0.023	-0.456	-0.361	-0.568**
	(0.956)	(0.408)	(0.936)	(0.108)	(0.268)	(0.049)
Leverage	-0.042**	-0.042**	-0.045**	-0.043**	-0.045**	-0.032*
	(0.021)	(0.018)	(0.012)	(0.017)	(0.018)	(0.080)
ROA	-0.027	-0.057*	-0.047	-0.043	-0.051	-0.059*
	(0.383)	(0.063)	(0.136)	(0.153)	(0.115)	(0.060)
Dividends	0.146**	0.142**	0.157**	0.111*	0.158**	0.146**
	(0.017)	(0.021)	(0.013)	(0.060)	(0.014)	(0.019)
Cash	0.074**	0.078**	0.081**	0.082**	0.076**	0.099***
	(0.025)	(0.013)	(0.014)	(0.013)	(0.021)	(0.003)
_cons	93.181***	98.118***	94.834***	97.450***	99.567***	99.870***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,090	1,156	1,048	1,065	1,098	1,005
Number of companies	128	130	126	128	130	127
Wald chi2	946.12	1030.54	976.46	980.46	928.56	970.73
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.6. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Annual-pension			Total-pension		
CEO-DB-pension	-0.509		-1.077***	-0.03		-0.078***
	(0.113)		(0.001)	(0.196)		(0.000)
CEO-aboveCAP-member	-3.694***		-3.864***	-3.24***		-3.683***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.607*		1.151***	0.035		0.077***
	(0.063)		(0.000)	(0.137)		(0.000)
Single-scheme	3.528***	4.913***	3.215***	4.481***	5.303***	4.120***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO-DB-pension*Single-scheme	-3.363**		-2.509*	-0.564***		-0.517**
	(0.012)		(0.063)	(0.001)		(0.014)
CEO-aboveCAP-member*Single-scheme	2.584*		2.641*	0.044		0.900
	(0.079)		(0.085)	(0.979)		(0.616)
CEO-DB-pension*CEO-aboveCAP-member*Single-scheme	3.240**		2.408*	0.559***		0.517**
	(0.016)		(0.076)	(0.002)		(0.014)
ln (CEO-Company-tenure)	-0.084		-0.026	0.294		0.413
	(0.789)		(0.937)	(0.305)		(0.187)
Accounting-background	-0.307		-0.551	0.093		-0.277
	(0.656)		(0.460)	(0.882)		(0.689)
CFO-DB-pension		0.493	-0.243		0.062**	0.018
		(0.149)	(0.482)		(0.011)	(0.370)
CFO-aboveCAP-member		0.690	0.355		0.978	1.618**
		(0.340)	(0.639)		(0.219)	(0.038)
CFO-DB-pension*CFO-aboveCAP-member		-0.406	0.305		-0.056**	-0.014
		(0.243)	(0.389)		(0.022)	(0.492)
CFO-DB-pension*Single-scheme		-0.442	0.363		-0.062*	-0.014
		(0.278)	(0.370)		(0.069)	(0.646)
CFO-aboveCAP-member*Single-scheme		0.692	1.316		0.761	1.064
		(0.638)	(0.404)		(0.625)	(0.504)
CFO-DB-pension*CFO-aboveCAP-member*Single-scheme		0.088	-0.750*		0.036	-0.009
		(0.837)	(0.079)		(0.311)	(0.770)
ln (CFO-Company-tenure)		-0.516*	-0.371		-0.55*	-0.595*
		(0.089)	(0.237)		(0.076)	(0.063)
%Equity	-0.109***	-0.111***	-0.113***	-0.104***	-0.113***	-0.105***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.365**	-0.291**	-0.335**	-0.511***	-0.357***	-0.457***
	(0.029)	(0.050)	(0.033)	(0.002)	(0.020)	(0.003)
Maturity	0.495***	0.559***	0.459***	0.655***	0.553***	0.594***
	(0.002)	(0.000)	(0.005)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.025	-0.199	0.049	-0.578**	-0.301	-0.514*
	(0.933)	(0.524)	(0.868)	(0.040)	(0.360)	(0.079)
Leverage	-0.043**	-0.044**	-0.042**	-0.040**	-0.047**	-0.027
	(0.019)	(0.014)	(0.020)	(0.025)	(0.014)	(0.143)
ROA	-0.026	-0.060*	-0.046	-0.040	-0.058*	-0.051
	(0.405)	(0.055)	(0.149)	(0.182)	(0.075)	(0.106)
Dividends	0.140**	0.173***	0.181***	0.110*	0.184***	0.158**
	(0.026)	(0.007)	(0.007)	(0.060)	(0.005)	(0.012)
Cash	0.075**	0.087***	0.088***	0.079**	0.084**	0.098***
	(0.025)	(0.006)	(0.009)	(0.015)	(0.012)	(0.003)
_cons	93.659***	97.669***	94.638***	98.67***	98.427***	98.081***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,090	1,156	1,048	1,065	1,098	1,005
Number of companies	128	130	126	128	130	127
Wald chi2	940.16	1034.27	959.44	1009.9	911.38	945.12
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.7

FGLS results for funding of DB schemes (*%FR*)

This tables reports results from FGLS regressions on whether CEO DB pension holdings are related to the dependent variable, Funding Ratio, which is defined as the ratio of pension assets to the value of pension liabilities. Panel A reports results from regressions including a two-way interaction term and Panel B reports results from regressions including a three-way interaction term. Models 1 to 3 include a two-way interaction Annual-pension*aboveCAP-member and Models 4 to 6 include a two-way interaction Total-pension*aboveCAP-member. Models 7 to 9 include a three-way interaction Annual-pension*aboveCAP-member*Single-scheme and Models 10 to 12 include a three-way interaction Total-pension*aboveCAP-member*Single-scheme. Regressions reported in this table control for Board-tenure. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A:

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Annual-pension			Total-pension		
CEO-DB-pension	-1.065***		-1.349***	-0.054**		-0.089***
	(0.002)		(0.000)	(0.040)		(0.000)
CEO-aboveCAP-member	-3.603***		-4.269***	-3.202***		-3.787***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	1.141***		1.453***	0.057**		0.091***
	(0.001)		(0.000)	(0.029)		(0.000)
Single-scheme	4.256***	4.920***	3.831***	4.379***	5.013***	3.919***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (CEO-Board-tenure)	0.175		0.268	0.357		0.254
	(0.565)		(0.394)	(0.209)		(0.404)
Accounting-background	-0.274		-0.151	0.181		0.058
	(0.687)		(0.838)	(0.772)		(0.933)
CFO-DB-pension		0.007	0.085		0.025	0.010
		(0.970)	(0.670)		(0.151)	(0.466)
CFO-aboveCAP		0.329	0.644		0.926	2.064***
		(0.546)	(0.319)		(0.194)	(0.003)
CFO-DB-pension*CFO-aboveCAP-member		-0.073	-0.177		-0.032*	-0.019
		(0.709)	(0.391)		(0.068)	(0.172)
ln (CFO-Board-tenure)		-0.317	-0.103		-0.135	-0.368
		(0.235)	(0.706)		(0.628)	(0.197)
%Equity	-0.104***	-0.113***	-0.106***	-0.107***	-0.111***	-0.118***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.493***	-0.311**	-0.490***	-0.540***	-0.377**	-0.526***
	(0.003)	(0.041)	(0.002)	(0.001)	(0.015)	(0.000)
Maturity	0.579***	0.502***	0.549***	0.680***	0.620***	0.667***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.079	-0.366	0.048	-0.479*	-0.354	-0.612**
	(0.791)	(0.234)	(0.871)	(0.097)	(0.282)	(0.038)
Leverage	-0.042**	-0.038**	-0.048***	-0.042**	-0.044**	-0.034*
	(0.018)	(0.031)	(0.006)	(0.020)	(0.020)	(0.059)
ROA	-0.025	-0.064**	-0.046	-0.038	-0.050	-0.058*
	(0.422)	(0.037)	(0.146)	(0.211)	(0.125)	(0.063)
Dividends	0.139**	0.130**	0.165***	0.114*	0.160**	0.154**
	(0.022)	(0.035)	(0.009)	(0.052)	(0.013)	(0.012)
Cash	0.073**	0.075**	0.080**	0.084**	0.070**	0.100***
	(0.027)	(0.018)	(0.016)	(0.011)	(0.034)	(0.003)
_cons	91.857***	98.654***	92.746***	97.591***	98.750***	100.150***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,085	1,136	1,048	1,065	1,098	1,005
Number of companies	128	128	126	128	130	127
Wald chi2	944.51	1029.66	984.82	996.36	922.77	973.36
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.8. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Annual-pension			Total-pension		
CEO-DB-pension	-0.540		-1.069***	-0.032		-0.079***
	(0.105)		(0.001)	(0.172)		(0.000)
CEO-aboveCAP-member	-3.935***		-4.180***	-3.165***		-3.572***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.633*		1.143***	0.036		0.078***
	(0.061)		(0.001)	(0.129)		(0.000)
Single-scheme	3.725***	5.090***	3.363***	4.589***	5.426***	4.060***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO-DB-pension*Single-scheme	-3.337**		-2.557*	-0.575***		-0.528**
	(0.014)		(0.062)	(0.001)		(0.012)
CEO-aboveCAP-member*Single-scheme	2.206		2.291	-0.136		0.708
	(0.135)		(0.133)	(0.934)		(0.694)
CEO-DB-pension*CEO-aboveCAP-member*Single-scheme	3.242**		2.478*	0.572***		0.530**
	(0.017)		(0.071)	(0.001)		(0.012)
ln (CEO-Company-tenure)	0.217		0.274	0.362		0.394
	(0.489)		(0.402)	(0.206)		(0.203)
Accounting-background	-0.323		-0.437	0.068		-0.275
	(0.644)		(0.564)	(0.914)		(0.695)
CFO-DB-pension		-0.352	-0.295		0.009	0.016
		(0.287)	(0.389)		(0.647)	(0.426)
CFO-aboveCAP-member		-0.144	-0.098		0.276	1.225
		(0.811)	(0.892)		(0.675)	(0.103)
CFO-DB-pension*CFO-aboveCAP-member		0.436	0.347		-0.004	-0.012
		(0.195)	(0.323)		(0.826)	(0.558)
CFO-DB-pension*Single-scheme		0.456	0.396		-0.004	-0.014
		(0.245)	(0.327)		(0.893)	(0.666)
CFO-aboveCAP-member*Single-scheme		0.781	1.301		0.611	1.038
		(0.598)	(0.412)		(0.697)	(0.515)
CFO-DB-pension*CFO-aboveCAP-member*Single-scheme		-0.791*	-0.774*		-0.02	-0.011
		(0.055)	(0.069)		(0.529)	(0.736)
ln (CFO-Company-tenure)		-0.264	-0.058		-0.301	-0.377
		(0.323)	(0.839)		(0.269)	(0.205)
%Equity	-0.105***	-0.117***	-0.110***	-0.104***	-0.123***	-0.107***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.417**	-0.306**	-0.388	-0.549***	-0.370**	-0.485***
	(0.014)	(0.041)	(0.015)	(0.001)	(0.017)	(0.002)
Maturity	0.509***	0.462***	0.479***	0.673***	0.475***	0.597***
	(0.001)	(0.003)	(0.003)	(0.000)	(0.003)	(0.000)
ln (Company-size)	0.092	-0.323	0.113	-0.595**	-0.566*	-0.522*
	(0.758)	(0.283)	(0.701)	(0.039)	(0.073)	(0.080)
Leverage	-0.044**	-0.035**	-0.046***	-0.039**	-0.038**	-0.031*
	(0.015)	(0.048)	(0.010)	(0.027)	(0.049)	(0.091)
ROA	-0.023	-0.065**	-0.045	-0.035	-0.065**	-0.049
	(0.459)	(0.035)	(0.160)	(0.242)	(0.041)	(0.122)
Dividends	0.136**	0.156**	0.189***	0.114*	0.162**	0.169***
	(0.032)	(0.014)	(0.005)	(0.052)	(0.013)	(0.007)
Cash	0.073**	0.083***	0.088***	0.081**	0.078**	0.101***
	(0.030)	(0.009)	(0.009)	(0.013)	(0.019)	(0.002)
_cons	92.177***	98.281***	92.557***	98.706***	100.738***	97.762***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,085	1,136	1,048	1,065	1,078	1,005
Number of companies	128	128	126	128	128	127
Wald chi2	937.28	1001.93	967.29	1024.01	877.67	942.4
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.9

FGLS results for funding of DB schemes (*%FR*)

This tables reports results from FGLS regressions on whether CEO DB pension holdings are related to the dependent variable, Funding Ratio, which is defined as the ratio of pension assets to the value of pension liabilities. Panel A reports results from regressions including a two-way interaction term and Panel B reports results from regressions including a three-way interaction term. Models 1 to 3 include a two-way interaction Annual-pension*aboveCAP-member and Models 4 to 6 include a two-way interaction Total-pension*aboveCAP-member. Models 7 to 9 include a three-way interaction Annual-pension*aboveCAP-member*Single-scheme and Models 10 to 12 include a three-way interaction Total-pension*aboveCAP-member*Single-scheme. Regressions reported in this table control for Age. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A:

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Annual-pension			Total-pension		
CEO-DB-pension	-0.935***		-0.835**	-0.045*		-0.036
	(0.005)		(0.012)	(0.071)		(0.107)
CEO-aboveCAP-member	-3.348***		-3.535***	-2.708***		-2.788***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	1.007***		0.918***	0.049*		0.035
	(0.003)		(0.006)	(0.054)		(0.113)
Single-scheme	4.104***	4.258***	3.943***	4.282***	4.672***	3.705***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (CEO-Age)	2.458		3.990*	2.068		1.263
	(0.230)		(0.063)	(0.286)		(0.528)
Accounting-background	0.134		-0.335	0.440		-0.225
	(0.843)		(0.645)	(0.488)		(0.743)
CFO-DB-pension		0.139	0.126		0.027	0.011
		(0.443)	(0.510)		(0.116)	(0.493)
CFO-aboveCAP		1.238**	1.039*		1.489**	1.962***
		(0.033)	(0.077)		(0.020)	(0.002)
CFO-DB-pension*CFO-aboveCAP-member		-0.247	-0.232		-0.034**	-0.019
		(0.187)	(0.237)		(0.048)	(0.240)
ln (CFO-Age)		-9.693***	-7.206***		-9.404***	-8.915***
		(0.000)	(0.002)		(0.000)	(0.000)
%Equity	-0.102***	-0.118***	-0.109***	-0.105***	-0.122***	-0.124***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.436***	-0.276**	-0.404***	-0.484***	-0.319**	-0.509***
	(0.007)	(0.048)	(0.004)	(0.002)	(0.029)	(0.000)
Maturity	0.592	0.654	0.688	0.660	0.687	0.740
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.106	-0.152	0.176	-0.482*	-0.279	-0.575**
	(0.721)	(0.622)	(0.544)	(0.094)	(0.378)	(0.048)
Leverage	-0.045**	-0.046***	-0.057***	-0.041**	-0.049***	-0.032*
	(0.011)	(0.008)	(0.001)	(0.021)	(0.009)	(0.082)
ROA	-0.031	-0.065**	-0.053*	-0.040	-0.062*	-0.057*
	(0.320)	(0.033)	(0.089)	(0.188)	(0.053)	(0.076)
Dividends	0.145**	0.159***	0.182***	0.099*	0.166***	0.153**
	(0.017)	(0.009)	(0.004)	(0.094)	(0.009)	(0.018)
Cash	0.073**	0.066**	0.074**	0.087***	0.062*	0.094***
	(0.028)	(0.036)	(0.020)	(0.007)	(0.058)	(0.004)
_cons	82.166***	134.557***	104.527***	90.174***	134.702***	91.174***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,084	1,120	1,041	1,059	1,097	998
Number of companies	128	128	126	128	130	127
Wald chi2	963.74	1054.04	982.45	1031.02	975.98	1018.28
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.9. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Annual-pension			Total-pension		
CEO-DB-pension	-0.454		-0.382	-0.027		-0.031
	(0.161)		(0.224)	(0.234)		(0.130)
CEO-aboveCAP-member	-3.556***		-3.406***	-2.66***		-2.611***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.544*		0.45	0.031		0.028
	(0.099)		(0.159)	(0.177)		(0.165)
Single-scheme	3.553***	4.422***	3.397***	4.568***	4.761***	3.771***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO-DB-pension*Single-scheme	-3.434**		-3.297**	-0.578***		-0.533**
	(0.012)		(0.017)	(0.001)		(0.013)
CEO-aboveCAP-member*Single-scheme	2.116		1.426	-0.08		0.495
	(0.146)		(0.335)	(0.961)		(0.776)
CEO-DB-pension*CEO-aboveCAP-member*Single-scheme	3.326**		3.217**	0.573***		0.533**
	(0.016)		(0.020)	(0.002)		(0.013)
ln (CEO-Age)	1.884		3.049	1.963		0.58
	(0.355)		(0.154)	(0.305)		(0.769)
Accounting-background	0.021		-0.532	0.292		-0.436
	(0.976)		(0.472)	(0.645)		(0.525)
CFO-DB-pension		0.42	-0.152		0.062**	0.010
		(0.203)	(0.633)		(0.012)	(0.572)
CFO-aboveCAP-member		0.907	0.324		1.030	1.247*
		(0.157)	(0.625)		(0.139)	(0.066)
CFO-DB-pension*CFO-aboveCAP-member		-0.369	0.169		-0.056**	-0.007
		(0.273)	(0.605)		(0.024)	(0.720)
CFO-DB-pension*Single-scheme		-0.361	0.271		-0.061*	-0.009
		(0.365)	(0.477)		(0.078)	(0.764)
CFO-aboveCAP-member*Single-scheme		0.210	1.366		0.400	1.311
		(0.887)	(0.387)		(0.800)	(0.411)
CFO-DB-pension*CFO-aboveCAP-member*Single-scheme		0.046	-0.611		0.035	-0.015
		(0.912)	(0.131)		(0.329)	(0.626)
ln (CFO-Age)		-9.613***	-6.578***		-9.772***	-9.057***
		(0.000)	(0.005)		(0.000)	(0.000)
%Equity	-0.103***	-0.12***	-0.112***	-0.103***	-0.121***	-0.117***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.372**	-0.251*	-0.327**	-0.503***	-0.288**	-0.496***
	(0.024)	(0.071)	(0.025)	(0.001)	(0.050)	(0.001)
Maturity	0.522***	0.597***	0.574***	0.658***	0.602***	0.699***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.075	-0.057	0.178	-0.614**	-0.193	-0.606**
	(0.801)	(0.854)	(0.543)	(0.032)	(0.545)	(0.039)
Leverage	-0.046***	-0.049***	-0.054***	-0.039**	-0.052***	-0.034*
	(0.010)	(0.006)	(0.002)	(0.029)	(0.006)	(0.067)
ROA	-0.028	-0.067**	-0.049	-0.036	-0.069**	-0.058*
	(0.376)	(0.030)	(0.124)	(0.236)	(0.032)	(0.073)
Dividends	0.141**	0.191***	0.208***	0.103*	0.193***	0.181***
	(0.026)	(0.002)	(0.002)	(0.078)	(0.003)	(0.006)
Cash	0.071**	0.074**	0.080**	0.083***	0.071**	0.096***
	(0.032)	(0.020)	(0.015)	(0.010)	(0.032)	(0.003)
_cons	85.337***	132.864***	106.05***	91.921***	134.56***	132.4***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,084	1,155	1,041	1,059	1,097	998
Number of companies	128	130	126	128	130	127
Wald chi2	946.15	1081.74	963.26	1051.38	950.83	1012.87
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.10 (2004-2015 period)

FGLS results for funding of DB schemes (*%FR*)

This tables reports results from FGLS regressions on whether CEO DB pension holdings are related to the dependent variable, Funding Ratio, which is defined as the ratio of pension assets to the value of pension liabilities. Panel A reports results from regressions including a two-way interaction term and Panel B reports results from regressions including a three-way interaction term. Models 1 to 3 include a two-way interaction Annual-pension*aboveCAP-member and Models 4 to 6 include a two-way interaction Total-pension*aboveCAP-member. Models 7 to 9 include a three-way interaction Annual-pension*aboveCAP-member*Single-scheme and Models 10 to 12 include a three-way interaction Total-pension*aboveCAP-member*Single-scheme. Regressions reported in this table control for Role-tenure. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A:

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Annual-pension			Total-pension		
CEO-DB-pension	-1.021***		-1.172***	-0.054**		-0.082***
	(0.002)		(0.000)	(0.036)		(0.001)
CEO-aboveCAP-member	-3.459***		-3.480***	-3.245***		-3.687***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	1.060***		1.213***	0.054**		0.079***
	(0.002)		(0.000)	(0.038)		(0.001)
Single-scheme	4.688***	4.458***	4.012***	4.676***	4.998***	4.086***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (CEO-Role-tenure)	0.540**		0.602**	0.635***		0.710***
	(0.018)		(0.012)	(0.008)		(0.005)
Accounting-background	-0.032		-0.302	0.207		-0.254
	(0.962)		(0.669)	(0.751)		(0.713)
CFO-DB-pension		0.106	0.015		0.010	0.007
		(0.528)	(0.938)		(0.553)	(0.663)
CFO-aboveCAP-member		-0.802	-0.021		-0.838	0.834
		(0.131)	(0.971)		(0.144)	(0.184)
CFO-DB-pension*CFO-aboveCAP-member		-0.160	-0.089		-0.014	-0.012
		(0.355)	(0.651)		(0.414)	(0.503)
ln (CFO-Role-tenure)		0.056	-0.163		0.098	-0.170
		(0.824)	(0.523)		(0.701)	(0.524)
%Equity	-0.123***	-0.120***	-0.117***	-0.126***	-0.124***	-0.128***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.425***	-0.266	-0.418***	-0.419**	-0.334**	-0.423***
	(0.010)	(0.109)	(0.010)	(0.011)	(0.046)	(0.010)
Maturity	0.651***	0.649***	0.642***	0.760***	0.719***	0.849***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.290	0.066	0.213	-0.224	-0.073	-0.336
	(0.338)	(0.835)	(0.488)	(0.457)	(0.821)	(0.269)
Leverage	-0.049***	-0.052***	-0.053***	-0.046**	-0.055***	-0.039**
	(0.004)	(0.004)	(0.002)	(0.012)	(0.004)	(0.037)
ROA	-0.025	-0.055*	-0.041	-0.036	-0.060*	-0.046
	(0.401)	(0.062)	(0.178)	(0.252)	(0.053)	(0.153)
Dividends	0.177***	0.195***	0.167***	0.160***	0.202***	0.181***
	(0.002)	(0.001)	(0.004)	(0.010)	(0.001)	(0.005)
Cash	0.048	0.063**	0.048	0.057*	0.060*	0.057*
	(0.128)	(0.046)	(0.133)	(0.073)	(0.067)	(0.070)
_cons	84.441***	69.265***	71.086***	86.942***	71.807***	75.176***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,224	1,298	1,177	1,199	1,237	1,134
Number of companies	128	130	126	128	130	127
Wald chi2	1314.9	1301.92	1284.71	1280.28	1259.14	1368.61
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.10. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Annual-pension			Total-pension		
CEO-DB-pension	-0.625*		-0.957***	-0.034		-0.071***
	(0.067)		(0.006)	(0.147)		(0.003)
CEO-aboveCAP-member	-3.420***		-3.281***	-3.026***		-3.421***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.637*		0.958***	0.034		0.066***
	(0.065)		(0.006)	(0.154)		(0.006)
Single-scheme	4.277***	5.433***	4.195***	5.093***	5.9158***	4.927***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO-DB-pension*Single-scheme	-2.273*		-1.157	-0.457***		-0.426**
	(0.069)		(0.276)	(0.009)		(0.036)
CEO-aboveCAP-member*Single-scheme	-0.020		0.272	-1.517		-0.772
	(0.985)		(0.831)	(0.206)		(0.600)
CEO-DB-pension*CEO-aboveCAP-member*Single-scheme	2.298*		1.180	0.458***		0.433**
	(0.067)		(0.267)	(0.009)		(0.034)
ln (CEO-Role-tenure)	0.551**		0.591**	0.663***		0.802***
	(0.020)		(0.018)	(0.005)		(0.002)
Accounting-background	0.0501		-0.264	0.141		-0.567
	(0.941)		(0.710)	(0.829)		(0.408)
CFO-DB-pension		0.183	-0.453		0.025	0.005
		(0.588)	(0.196)		(0.324)	(0.817)
CFO-aboveCAP-member		-0.470	-0.224		-0.461	0.841
		(0.423)	(0.729)		(0.461)	(0.223)
CFO-DB-pension*CFO-aboveCAP-member		-0.195	0.445		-0.025	-0.002
		(0.569)	(0.210)		(0.331)	(0.915)
CFO-DB-pension*Single-scheme		-0.102	0.595		-0.022	0.004
		(0.795)	(0.142)		(0.508)	(0.901)
CFO-aboveCAP-member*Single-scheme		-1.135	-0.031		-1.263	-0.156
		(0.307)	(0.980)		(0.261)	(0.907)
CFO-DB-pension*CFO-aboveCAP-member*Single-scheme		-0.053	-0.828**		0.011	-0.021
		(0.898)	(0.049)		(0.744)	(0.542)
ln (CFO-Role-tenure)		0.097	-0.086		0.118	-0.187
		(0.706)	(0.743)		(0.654)	(0.494)
%Equity	-0.123***	-0.125***	-0.117***	-0.126***	-0.128***	-0.128***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.383**	-0.313*	-0.422***	-0.444***	-0.374**	-0.439***
	(0.021)	(0.056)	(0.009)	(0.007)	(0.026)	(0.008)
Maturity	0.6105***	0.6278***	0.6086***	0.7747***	0.6885***	0.832***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.210	0.117	0.264	-0.383	-0.027	-0.279
	(0.480)	(0.715)	(0.383)	(0.197)	(0.935)	(0.361)
Leverage	-0.051***	-0.051***	-0.053***	-0.044**	-0.053***	-0.035*
	(0.004)	(0.005)	(0.002)	(0.017)	(0.005)	(0.061)
ROA	-0.029	-0.052*	-0.044	-0.035	-0.058*	-0.044
	(0.335)	(0.082)	(0.152)	(0.262)	(0.065)	(0.173)
Dividends	0.175***	0.219***	0.191***	0.161***	0.222***	0.200***
	(0.003)	0.000	(0.002)	(0.010)	0.000	(0.002)
Cash	0.044	0.069**	0.050	0.053*	0.063*	0.057*
	(0.162)	(0.026)	(0.119)	(0.095)	(0.051)	(0.067)
_cons	85.720***	68.660***	69.996***	89.078***	71.125***	73.371***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,224	1,298	1,177	1,199	1,237	1,134
Number of companies	128	130	126	128	130	127
Wald chi2	1264.32	1330.16	1257.71	1299.48	1298.33	1416.47
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.11 (2004-2015 period)

FGLS results for funding of DB schemes (*%FR*)

This tables reports results from FGLS regressions on whether CEO DB pension holdings are related to the dependent variable, Funding Ratio, which is defined as the ratio of pension assets to the value of pension liabilities. Panel A reports results from regressions including a two-way interaction term and Panel B reports results from regressions including a three-way interaction term. Models 1 to 3 include a two-way interaction Annual-pension*aboveCAP-member and Models 4 to 6 include a two-way interaction Total-pension*aboveCAP-member. Models 7 to 9 include a three-way interaction Annual-pension*aboveCAP-member*Single-scheme and Models 10 to 12 include a three-way interaction Total-pension*aboveCAP-member*Single-scheme. Regressions reported in this table control for Company-tenure. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A:

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Annual-pension			Total-pension		
CEO-DB-pension	-1.022***		-1.196***	-0.048*		-0.076***
	(0.002)		(0.000)	(0.058)		(0.001)
CEO-aboveCAP-member	-3.184***		-3.206***	-3.207***		-3.641***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	1.047***		1.221***	0.047*		0.074***
	(0.002)		(0.000)	(0.061)		(0.002)
Single-scheme	4.525***	4.607***	3.781***	4.634***	5.115***	4.172***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (CEO-Company-tenure)	-0.014		0.012	0.347		0.384
	(0.960)		(0.968)	(0.188)		(0.170)
Accounting-background	-0.076		-0.319	0.176		-0.273
	(0.909)		(0.650)	(0.789)		(0.692)
CFO-DB-pension		0.104	0.033		0.010	0.005
		(0.533)	(0.861)		(0.552)	(0.760)
CFO-aboveCAP-member		-0.806	0.033		-0.847	0.779
		(0.138)	(0.955)		(0.148)	(0.225)
CFO-DB-pension*CFO-aboveCAP-member		-0.158	-0.100		-0.014	-0.010
		(0.359)	(0.608)		(0.413)	(0.583)
ln (CFO-Company-tenure)		0.041	-0.163		0.071	-0.131
		(0.872)	(0.534)		(0.783)	(0.631)
%Equity	-0.126***	-0.121***	-0.123***	-0.128***	-0.125***	-0.130***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.376**	-0.269	-0.355**	-0.374**	-0.335**	-0.399**
	(0.023)	(0.103)	(0.027)	(0.025)	(0.045)	(0.016)
Maturity	0.611***	0.655***	0.597***	0.741***	0.723***	0.823***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.170	0.065	0.111	-0.275	-0.069	-0.379
	(0.569)	(0.837)	(0.715)	(0.357)	(0.831)	(0.207)
Leverage	-0.049***	-0.051***	-0.050***	-0.045**	-0.054***	-0.036*
	(0.005)	(0.004)	(0.004)	(0.016)	(0.004)	(0.057)
ROA	-0.032	-0.056*	-0.049	-0.042	-0.061**	-0.051
	(0.294)	(0.059)	(0.114)	(0.184)	(0.048)	(0.110)
Dividends	0.174***	0.191***	0.169***	0.150**	0.199***	0.168***
	(0.003)	(0.001)	(0.005)	(0.017)	(0.001)	(0.009)
Cash	0.050	0.065**	0.048	0.055*	0.062*	0.058*
	(0.112)	(0.038)	(0.136)	(0.089)	(0.055)	(0.066)
_cons	86.444***	69.403***	72.814***	87.375***	71.909***	75.817***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,224	1,298	1,177	1,199	1,237	1,134
Number of companies	128	130	126	128	130	127
Wald chi2	1281.73	1303.49	1255.82	1263.11	1260.64	1370.32
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.11. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Annual-pension			Total-pension		
CEO-DB-pension	-0.568*		-0.936***	-0.028		-0.063***
	(0.086)		(0.006)	(0.220)		(0.007)
CEO-aboveCAP-member	-3.162***		-2.910***	-2.922***		-3.280***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.077*		0.005***	0.028		0.059**
	(0.086)		(0.006)	(0.219)		(0.013)
Single-scheme	4.192***	5.564***	3.978***	5.075***	6.021***	4.950***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO-DB-pension*Single-scheme	-2.557**		-1.413	-0.443**		-0.402**
	(0.044)		(0.205)	(0.011)		(0.048)
CEO-aboveCAP-member*Single-scheme	0.220		0.380	-1.457		-0.772
	(0.842)		(0.769)	(0.225)		(0.604)
CEO-DB-pension*CEO-aboveCAP-member*Single-scheme	2.540**		1.390	0.442**		0.406**
	(0.047)		(0.215)	(0.011)		(0.047)
ln (CEO-Company-tenure)	-0.034		-0.099	0.299		0.355
	(0.903)		(0.738)	(0.257)		(0.213)
Accounting-background	0.047		-0.191	0.126		-0.514
	(0.945)		(0.787)	(0.848)		(0.453)
CFO-DB-pension		0.174	-0.488		0.025	-0.002
		(0.609)	(0.165)		(0.330)	(0.917)
CFO-aboveCAP-member		-0.477	-0.246		-0.470	0.719
		(0.427)	(0.708)		(0.460)	(0.308)
CFO-DB-pension*CFO-aboveCAP-member		0.588	0.481		-0.025	0.004
		(0.609)	(0.177)		(0.336)	(0.862)
CFO-DB-pension*Single-scheme		-0.092	0.647		-0.022	0.014
		(0.815)	(0.111)		(0.509)	(0.683)
CFO-aboveCAP-member*Single-scheme		-1.187	0.164		-1.315	-0.133
		(0.285)	(0.897)		(0.243)	(0.921)
CFO-DB-pension*CFO-aboveCAP-member*Single-scheme		-0.061	-0.880**		0.011	-0.029
		(0.883)	(0.038)		(0.746)	(0.399)
ln (CFO-Company-tenure)		0.082	-0.093		0.092	-0.071
		(0.755)	(0.736)		(0.728)	(0.803)
%Equity	-0.126***	-0.126***	-0.122***	-0.128***	-0.129***	-0.130***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.331**	-0.313*	-0.376**	-0.404**	-0.372**	-0.414**
	(0.045)	(0.055)	(0.017)	(0.015)	(0.026)	(0.012)
Maturity	0.572***	0.633***	0.572***	0.753***	0.692***	0.801***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.098	0.115	0.118	-0.451	-0.013	-0.353
	(0.740)	(0.716)	(0.693)	(0.127)	(0.969)	(0.241)
Leverage	-0.049***	-0.050***	-0.052***	-0.042**	-0.052***	-0.030
	(0.005)	(0.006)	(0.003)	(0.023)	(0.006)	(0.113)
ROA	-0.033	-0.052*	-0.051*	-0.040	-0.059*	-0.047
	(0.274)	(0.081)	(0.096)	(0.204)	(0.061)	(0.143)
Dividends	0.171***	0.216***	0.182***	0.150**	0.222***	0.184***
	(0.004)	(0.000)	(0.004)	(0.017)	(0.000)	(0.005)
Cash	0.046	0.071**	0.053	0.050	0.065**	0.059*
	(0.147)	(0.022)	(0.101)	(0.118)	(0.044)	(0.061)
_cons	87.746***	68.767***	72.261***	89.734***	71.100***	74.354***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,224	1,298	1,177	1,199	1,237	1,134
Number of companies	128	130	126	128	130	127
Wald chi2	1246.5	1331.96	1246.76	1281.27	1298.35	1416.01
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.12 (2004-2015 period)

FGLS results for funding of DB schemes (*%FR*)

This tables reports results from FGLS regressions on whether CEO DB pension holdings are related to the dependent variable, Funding Ratio, which is defined as the ratio of pension assets to the value of pension liabilities. Panel A reports results from regressions including a two-way interaction term and Panel B reports results from regressions including a three-way interaction term. Models 1 to 3 include a two-way interaction Annual-pension*aboveCAP-member and Models 4 to 6 include a two-way interaction Total-pension*aboveCAP-member. Models 7 to 9 include a three-way interaction Annual-pension*aboveCAP-member*Single-scheme and Models 10 to 12 include a three-way interaction Total-pension*aboveCAP-member*Single-scheme. Regressions reported in this table control for Board-tenure. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A:

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Annual-pension			Total-pension		
CEO-DB-pension	-1.035***		-1.207***	-0.050*		-0.078***
	(0.002)		(0.000)	(0.052)		(0.001)
CEO-aboveCAP-member	-3.266***		-3.375***	-3.179***		-3.597***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	1.064***		1.236***	0.049*		0.076***
	(0.002)		(0.000)	(0.053)		(0.002)
Single-scheme	4.731***	4.705***	4.043***	4.778***	5.029***	4.237***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (CEO-Board-tenure)	0.150		0.216	0.377		0.375
	(0.583)		(0.447)	(0.154)		(0.181)
Accounting-background	-0.098		-0.322	0.102		-0.327
	(0.884)		(0.648)	(0.877)		(0.639)
CFO-DB-pension		-0.025	0.018		0.010	0.005
		(0.891)	(0.927)		(0.561)	(0.745)
CFO-aboveCAP-member		-0.860*	-0.122		-0.905	0.737
		(0.087)	(0.830)		(0.115)	(0.240)
CFO-DB-pension*CFO-aboveCAP-member		-0.006	-0.088		-0.013	-0.010
		(0.975)	(0.658)		(0.419)	(0.570)
ln (CFO-Board-tenure)		-0.090	-0.023		0.181	-0.058
		(0.725)	(0.928)		(0.473)	(0.827)
%Equity	-0.124***	-0.133***	-0.121***	-0.130***	-0.124***	-0.132***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.413**	-0.326**	-0.414***	-0.415**	-0.333**	-0.428***
	(0.013)	(0.046)	(0.010)	(0.012)	(0.047)	(0.009)
Maturity	0.618***	0.622***	0.620***	0.743***	0.716***	0.827***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.210	-0.131	0.141	-0.274	-0.064	-0.382
	(0.487)	(0.685)	(0.646)	(0.362)	(0.841)	(0.206)
Leverage	-0.049***	-0.044**	-0.052***	-0.045**	-0.054***	-0.036**
	(0.005)	(0.015)	(0.003)	(0.015)	(0.004)	(0.057)
ROA	-0.027	-0.062**	-0.045	-0.037	-0.060*	-0.047
	(0.378)	(0.043)	(0.143)	(0.233)	(0.055)	(0.143)
Dividends	0.169***	0.168***	0.170***	0.153**	0.202***	0.172***
	(0.004)	(0.005)	(0.004)	(0.015)	(0.001)	(0.008)
Cash	0.045	0.066**	0.047	0.056*	0.060*	0.059*
	(0.152)	(0.036)	(0.144)	(0.078)	(0.065)	(0.060)
_cons	83.767***	72.190***	72.225***	87.222***	71.678***	75.939***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,219	1,268	1,177	1,199	1,237	1,134
Number of companies	128	128	126	128	130	127
Wald chi2	1291.73	1221.54	1270.24	1272.79	1261.03	1364.91
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.12. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
		Annual-pension			Total-pension	
CEO-DB-pension	-0.588*		-0.955***	-0.029		-0.066***
	(0.083)		(0.006)	(0.200)		(0.006)
CEO-aboveCAP-member	-3.230***		-3.112***	-2.917***		-3.282***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.608*		0.963***	0.202		0.010***
	(0.076)		(0.006)	(0.200)		(0.006)
Single-scheme	4.385***	5.585***	4.237***	5.200***	5.953***	5.026***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO-DB-pension*Single-scheme	-2.450*		-1.355	-0.450***		-0.410**
	(0.056)		(0.224)	(0.010)		(0.045)
CEO-aboveCAP-member*Single-scheme	-0.076		0.205	-1.550		-0.875
	(0.944)		(0.874)	(0.197)		(0.557)
CEO-DB-pension*CEO-aboveCAP-member*Single-scheme	2.449*		1.354	0.450**		0.415**
	(0.057)		(0.226)	(0.011)		(0.043)
ln (CEO-Board-tenure)	0.160		0.157	0.366		0.425
	(0.575)		(0.595)	(0.170)		(0.138)
Accounting-background	0.023		-0.231	0.045		-0.612
	(0.973)		(0.745)	(0.945)		(0.375)
CFO-DB-pension		-0.390	-0.504		0.024	0.001
		(0.257)	(0.147)		(0.349)	(0.978)
CFO-aboveCAP-member		-0.656	-0.337		-0.525	0.734
		(0.237)	(0.600)		(0.402)	(0.289)
CFO-DB-pension*CFO-aboveCAP-member		0.422	0.494		0.351	0.001
		(0.227)	(0.162)		(0.349)	(0.954)
CFO-DB-pension*Single-scheme		0.472	0.662		-0.021	0.010
		(0.231)	(0.102)		(0.537)	(0.773)
CFO-aboveCAP-member*Single-scheme		-0.875	0.057		-1.356	-0.145
		(0.433)	(0.964)		(0.230)	(0.914)
CFO-DB-pension*CFO-aboveCAP-member*Single-scheme		-0.652	-0.893**		0.011	-0.026
		(0.113)	(0.034)		(0.762)	(0.458)
ln (CFO-Board-tenure)		-0.094	0.035		0.194	-0.062
		(0.715)	(0.892)		(0.451)	(0.821)
%Equity	-0.125***	-0.137***	-0.122***	-0.130***	-0.128***	-0.132***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.364**	-0.350**	-0.413***	-0.439***	-0.374**	-0.442***
	(0.029)	(0.029)	(0.010)	(0.008)	(0.026)	(0.007)
Maturity	0.580***	0.610***	0.589***	0.757***	0.685***	0.806***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.141	-0.087	0.174	-0.441	-0.020	-0.343
	(0.636)	(0.780)	(0.563)	(0.139)	(0.953)	(0.260)
Leverage	-0.050***	-0.042***	-0.052***	-0.042**	-0.051***	-0.031*
	(0.004)	(0.022)	(0.003)	(0.022)	(0.007)	(0.100)
ROA	-0.030	-0.059*	-0.048	-0.036	-0.057*	-0.043
	(0.326)	(0.054)	(0.122)	(0.244)	(0.070)	(0.181)
Dividends	0.165***	0.185***	0.188***	0.153**	0.220***	0.190***
	(0.006)	(0.003)	(0.003)	(0.015)	(0.000)	(0.004)
Cash	0.042	0.071**	0.051	0.052	0.064**	0.059*
	(0.192)	(0.023)	(0.118)	(0.103)	(0.048)	(0.058)
_cons	85.542***	71.212***	71.391***	89.444***	71.009***	74.298***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,219	1,268	1,177	1,199	1,237	1,134
Number of companies	128	128	126	128	130	127
Wald chi2	1247.92	1255.54	1251.24	1292.08	1298.14	1404.82
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.13 (2004-2015 period)

FGLS results for funding of DB schemes (*%FR*)

This tables reports results from FGLS regressions on whether CEO DB pension holdings are related to the dependent variable, Funding Ratio, which is defined as the ratio of pension assets to the value of pension liabilities. Panel A reports results from regressions including a two-way interaction term and Panel B reports results from regressions including a three-way interaction term. Models 1 to 3 include a two-way interaction Annual-pension*aboveCAP-member and Models 4 to 6 include a two-way interaction Total-pension*aboveCAP-member. Models 7 to 9 include a three-way interaction Annual-pension*aboveCAP-member*Single-scheme and Models 10 to 12 include a three-way interaction Total-pension*aboveCAP-member*Single-scheme. Regressions reported in this table control for Age. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Panel A:

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	Annual-pension			Total-pension		
CEO-DB-pension	-0.892***		-0.866***	-0.046*		-0.051**
	(0.008)		(0.008)	(0.068)		(0.031)
CEO-aboveCAP-member	-3.177***		-2.882***	-2.957***		-2.953***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.918***		0.881***	0.045*		0.048**
	(0.007)		(0.007)	(0.072)		(0.044)
Single-scheme	4.348***	4.689***	3.774***	4.488***	4.727***	3.720***
	0.000	0.000	0.000	0.000	0.000	0.000
ln (CEO-Age)	3.402*		4.590**	3.648**		3.481*
	(0.071)		(0.022)	(0.049)		(0.075)
Accounting-background	0.199		0.013	0.360		-0.168
	(0.766)		(0.985)	(0.584)		(0.806)
CFO-DB-pension		-0.016	0.038		0.009	0.004
		(0.928)	(0.830)		(0.566)	(0.825)
CFO-aboveCAP-member		-0.821*	-0.043		-0.406	0.722
		(0.099)	(0.936)		(0.455)	(0.219)
CFO-DB-pension*CFO-aboveCAP-member		-0.015	-0.099		-0.012	-0.006
		(0.935)	(0.591)		(0.471)	(0.736)
ln (CFO-Age)		3.487*	-4.176**		-5.929***	-6.129***
		(0.066)	(0.049)		(0.005)	(0.004)
%Equity	-0.117***	-0.120***	-0.113***	-0.127***	-0.127***	-0.133***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.370**	-0.299*	-0.381***	-0.350**	-0.338**	-0.440***
	(0.020)	(0.072)	(0.008)	(0.031)	(0.033)	(0.004)
Maturity	0.634***	0.670***	0.669***	0.742***	0.736***	0.867***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.198	-0.039	0.191	-0.272	-0.051	-0.397
	(0.509)	(0.904)	(0.523)	(0.368)	(0.873)	(0.185)
Leverage	-0.053***	-0.051***	-0.058***	-0.044**	-0.061***	-0.038**
	(0.002)	(0.004)	(0.001)	(0.016)	(0.001)	(0.042)
ROA	-0.035	-0.045	-0.046	-0.032	-0.070**	-0.048
	(0.240)	(0.135)	(0.139)	(0.300)	(0.024)	(0.140)
Dividends	0.154***	0.167***	0.152**	0.145**	0.200***	0.160**
	(0.007)	(0.005)	(0.011)	(0.021)	(0.001)	(0.015)
Cash	0.050	0.051*	0.056*	0.059*	0.062*	0.064**
	(0.114)	(0.098)	(0.072)	(0.066)	(0.055)	(0.039)
_cons	72.847***	56.599***	70.097***	75.041***	95.531***	87.222***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,218	1,252	1,170	1,193	1,236	1,127
Number of companies	128	128	126	128	130	127
Wald chi2	1293.89	1259.57	1386.46	1294.31	1300.87	1374.94
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.13. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual- or Total- pension

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Annual-pension			Total-pension		
CEO-DB-pension	-0.518		-0.561*	-0.028		-0.041*
	(0.117)		(0.099)	(0.220)		(0.067)
CEO-aboveCAP	-3.174***		-2.714***	-2.707***		-2.624***
	(0.000)		(0.000)	(0.000)		(0.000)
CEO-DB-pension*CEO-aboveCAP-member	0.541		0.557	0.028		0.036
	(0.106)		(0.105)	(0.223)		(0.114)
Single-scheme	3.980***	5.608***	3.907***	4.958***	5.576***	4.412***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO-DB-pension*Single-scheme	-2.479*		-1.587	-0.439**		-0.396*
	(0.053)		(0.140)	(0.013)		(0.054)
CEO-aboveCAP-member*Single-scheme	0.253		0.066	-1.407		-1.029
	(0.818)		(0.959)	(0.242)		(0.485)
CEO-DB-pension*CEO-aboveCAP-member*Single-scheme	2.456*		1.577	0.437**		0.401*
	(0.056)		(0.144)	(0.013)		(0.051)
ln (CEO-Age)	3.338*		4.801**	3.459*		3.572*
	(0.077)		(0.017)	(0.062)		(0.067)
Accounting-background	0.305		0.103	0.306		-0.394
	(0.652)		(0.884)	(0.640)		(0.562)
CFO-DB-pension		-0.328	-0.310		0.037	0.003
		(0.335)	(0.363)		(0.143)	(0.897)
CFO-aboveCAP-member		-0.584	-0.193		-0.001	0.642
		(0.285)	(0.747)		(0.998)	(0.318)
CFO-DB-pension*CFO-aboveCAP-member		0.370	0.318		-0.035	0.003
		(0.283)	(0.357)		(0.172)	(0.891)
CFO-DB-pension*Single-scheme		0.401	0.441		-0.040	0.004
		(0.304)	(0.256)		(0.229)	(0.906)
CFO-aboveCAP-member*Single-scheme		-0.695	0.423		-1.053	0.371
		(0.533)	(0.735)		(0.349)	(0.784)
CFO-DB-pension*CFO-aboveCAP-member*Single-scheme		-0.613	-0.679*		0.028	-0.021
		(0.131)	(0.094)		(0.416)	(0.503)
ln (CFO-Age)		3.614**	-3.889*		-5.745***	-6.160***
		(0.050)	(0.069)		(0.007)	(0.004)
%Equity	-0.119***	-0.124***	-0.117***	-0.127***	-0.131***	-0.132***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.321**	-0.332**	-0.346**	-0.381**	-0.354**	-0.448***
	(0.045)	(0.040)	(0.019)	(0.019)	(0.026)	(0.004)
Maturity	0.594***	0.671***	0.620***	0.757***	0.706***	0.852***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln (Company-size)	0.131	-0.046	0.194	-0.432	-0.005	-0.385
	(0.657)	(0.881)	(0.506)	(0.148)	(0.989)	(0.201)
Leverage	-0.053***	-0.050***	-0.055***	-0.042**	-0.060***	-0.035*
	(0.002)	(0.005)	(0.001)	(0.023)	(0.001)	(0.065)
ROA	-0.035	-0.049*	-0.044	-0.031	-0.067**	-0.047
	(0.237)	(0.097)	(0.153)	(0.316)	(0.033)	(0.145)
Dividends	0.155***	0.186***	0.181***	0.144**	0.223***	0.178***
	(0.008)	(0.003)	(0.004)	(0.021)	(0.000)	(0.007)
Cash	0.046	0.053*	0.055*	0.055*	0.064**	0.067**
	(0.149)	(0.079)	(0.075)	(0.086)	(0.043)	(0.030)
_cons	74.239***	55.607***	67.740***	77.882***	94.16***	85.666***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	1,218	1,252	1,170	1,193	1,236	1,127
Number of companies	128	128	126	128	130	127
Wald chi2	1260.61	1363.82	1372.41	1311.26	1341.71	1398.72
Prob > chi2	0.000	0.000	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.14 (2004-2015 period)

FGLS results for funding of DB schemes (*%FR*) (H3)

This tables reports results from FGLS regressions in which dependent variable is Funding Ratio defined as the ratio of pension assets to the value of pension liabilities for the sub-sample of CEOs older/younger than 58 years. Models 1 to 2 in Panel A report results from regressions examining Annual-pension and Models 3 to 4 in Panel B report results from regressions examining Total-pension. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels.

Dependent variable - %FR
Explanatory pension variable - Annual-pension

	CEO older than 58 years?			
	Yes	No	Yes	No
	Model 1		Model 2	
CEO-Annual-pension	-9.271***	-0.759**	-8.997***	-0.747**
	(0.000)	(0.023)	(0.000)	(0.023)
CEO-aboveCAP-member	-5.183***	-4.218***	-1.439	-4.248***
	(0.000)	(0.000)	(0.128)	(0.000)
CEO-Annual-pension *CEO-aboveCAP-member	9.486***	0.851**	8.407***	0.822**
	(0.000)	(0.012)	(0.000)	(0.013)
ln (CEO-Age)	-2.546	2.862	27.281***	3.872
	(0.777)	(0.271)	(0.001)	(0.149)
Accounting-background	-1.864	0.432	-0.023	0.166
	(0.240)	(0.501)	(0.989)	(0.809)
CFO-Annual-pension			-0.919*	0.236
			(0.054)	(0.280)
CFO-aboveCAP-member			-1.116	0.451
			(0.302)	(0.486)
CFO-Annual-pension *CFO-aboveCAP-member			1.037**	-0.131
			(0.045)	(0.580)
ln (CFO-Age)			-17.978***	-3.052
			(0.000)	(0.208)
Single-scheme	0.977	4.614***	1.894	4.210***
	(0.355)	(0.000)	(0.104)	(0.000)
%Equity	-0.192***	-0.124***	-0.177***	-0.121***
	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.323*	-0.410**	-0.217	-0.374**
	(0.087)	(0.026)	(0.243)	(0.039)
Maturity	0.142	0.462***	0.402	0.524***
	(0.562)	(0.003)	(0.121)	(0.002)
ln (Company-size)	-1.094***	0.413	-0.859**	0.698**
	(0.010)	(0.119)	(0.045)	(0.013)
Leverage	-0.230***	-0.048***	-0.315***	-0.052***
	(0.000)	(0.010)	(0.000)	(0.008)
ROA	-0.401***	-0.033	-0.559***	-0.023
	(0.000)	(0.299)	(0.000)	(0.487)
Dividends	0.124	0.205***	-0.059	0.208***
	(0.132)	(0.005)	(0.494)	(0.006)
Cash	0.103*	0.024	0.091	0.025
	(0.058)	(0.500)	(0.105)	(0.490)
_cons	128.129***	59.383***	78.973***	63.770***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of obs	222	981	200	954
Number of companies	61	120	54	118
Wald chi2	3168.47	14830.04	6794.53	8615.52
Prob > chi2	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes

Table 4.14. continued

Panel B

Dependent variable - %FR
Explanatory pension variable - Annual-pension

	CEO older than 58 years?			
	Yes	**No**	**Yes**	**No**
	Model 3		Model 4	
CEO-Total-pension	-0.409***	-0.027	-0.390***	-0.024
	(0.000)	(0.287)	(0.000)	(0.348)
CEO-aboveCAP-member	-5.657***	-3.658***	-4.552***	-4.215***
	(0.000)	(0.000)	(0.001)	(0.000)
CEO-Total-pension *CEO-aboveCAP-member	0.444***	0.030	0.388***	0.026
	(0.000)	(0.250)	(0.000)	(0.311)
ln (CEO-Age)	-12.475**	6.910**	-2.330	7.100**
	(0.045)	(0.011)	(0.775)	(0.011)
Accounting-background	0.011	0.072	0.532	-0.270
	(0.994)	(0.916)	(0.728)	(0.710)
CFO-Total-pension			-0.189***	0.012
			(0.000)	(0.428)
CFO-aboveCAP-member			-1.043	1.591**
			(0.435)	(0.020)
CFO-Total-pension *CFO-aboveCAP-member			0.205***	-0.011
			(0.000)	(0.483)
ln (CFO-Age)			-26.106***	-5.460**
			(0.000)	(0.025)
Single-scheme	3.417***	4.665***	-3.145**	3.930***
	(0.003)	(0.000)	(0.031)	(0.000)
%Equity	-0.185***	-0.117***	-0.137***	-0.123***
	(0.000)	(0.000)	(0.000)	(0.000)
Closure-to-FA	-0.552***	-0.268	-0.057	-0.249
	(0.004)	(0.164)	(0.740)	(0.177)
Maturity	-0.258	0.758***	-0.167	0.921***
	(0.184)	(0.000)	(0.447)	(0.000)
ln (Company-size)	-0.883*	0.298	-1.596***	0.344
	(0.072)	(0.325)	(0.002)	(0.246)
Leverage	-0.285***	-0.054***	-0.337***	-0.043**
	(0.000)	(0.004)	(0.000)	(0.030)
ROA	-0.410***	-0.014	-0.533***	-0.004
	(0.000)	(0.668)	(0.000)	(0.914)
Dividends	0.175**	0.178**	0.251**	0.167**
	(0.048)	(0.015)	(0.038)	(0.028)
Cash	0.085*	0.042	0.009	0.054
	(0.081)	(0.249)	(0.872)	(0.146)
_cons	166.149***	41.889***	243.918***	60.315***
	(0.000)	(0.004)	(0.000)	(0.001)
Number of obs	220	955	190	918
Number of companies	57	120	51	119
Wald chi2	30962.79	1144.67	34588.77	3248.87
Prob > chi2	0.000	0.000	0.000	0.000
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes

Table 5.6: Logit regressions of DRCs

This tables reports results from logit regressions on whether CEO DB pension are related to the dependent variable DRCs that equals to 1 if the company made DRCs and 0 otherwise. Models 1 to 3 include a dummy variable aboveCAP-member that equals to 1 if CEO or CFO is a member of DB pension schemes with the pension above the compensation threshold. Models 4 to 6 include Annual-pension and Models 7 to 9 include Total-pension. Regressions reported in this table control for Company-tenure. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Standard errors are clustered at the company-level.

Dependent variable: DRCs (dummy)	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
CEO-aboveCAP-member	2.186**				2.089**													
	(0.014)				(0.026)													
CEO-Annual-pension								0.022**				0.018*						
								(0.029)				(0.062)						
CEO-Total-pension														0.002***				0.001**
														(0.010)				(0.035)
ln (CEO-Company-tenure)		-0.081*				-0.053		-0.063*				-0.046		-0.063*				-0.056
		(0.070)				(0.262)		(0.086)				(0.249)		(0.095)				(0.170)
Accounting-background	1.717				1.814*		1.533				1.609		1.924**				1.842**	
	(0.107)				(0.088)		(0.164)				(0.131)		(0.020)				(0.039)	
CFO-aboveCAP			1.540		1.278													
			(0.207)		(0.468)													
CFO-Annual-pension										0.008		0.001						
										(0.449)		(0.893)						
CFO-Total-pension																0.001		0
																(0.169)		(0.665)
ln (CFO-Company-tenure)				-0.048		-0.044				-0.021		-0.005				-0.028		-0.007
				(0.288)		(0.312)				(0.570)		(0.894)				(0.442)		(0.844)
Single-scheme	1.453		1.372		1.618		1.322		1.289		1.418		1.474		1.252		1.568	
	(0.298)		(0.384)		(0.170)		(0.386)		(0.445)		(0.269)		(0.241)		(0.505)		(0.166)	
%Equity		-0.004**		-0.004*		-0.004**		-0.004**		-0.003*		-0.004**		-0.004**		-0.003*		-0.004**
		(0.038)		(0.056)		(0.033)		(0.030)		(0.084)		(0.031)		(0.022)		(0.095)		(0.027)
Closure-to-FA		0.049**		0.043**		0.050**		0.039*		0.041**		0.039*		0.045**		0.046**		0.048**
		(0.017)		(0.031)		(0.013)		(0.062)		(0.047)		(0.059)		(0.027)		(0.026)		(0.018)
Maturity		0.016		0.013		0.014		0.017		0.014		0.017		0.007		0.011		0.01
		(0.472)		(0.581)		(0.546)		(0.387)		(0.530)		(0.398)		(0.732)		(0.637)		(0.639)
ln (Company-size)		-0.027		-0.019		-0.024		-0.038		-0.024		-0.034		-0.041		-0.029		-0.044
		(0.407)		(0.580)		(0.478)		(0.212)		(0.439)		(0.266)		(0.188)		(0.353)		(0.173)
Leverage		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0010		0.0000		0.0000
		(0.932)		(0.930)		(0.928)		(0.878)		(0.932)		(0.874)		(0.787)		(0.906)		(0.957)
ROA		0.005		0.005		0.004		0.007*		0.004		0.006		0.006		0.003		0.005
		(0.207)		(0.218)		(0.279)		(0.063)		(0.248)		(0.120)		(0.116)		(0.397)		(0.210)
Dividends		0.01		0.017*		0.016		0.01		0.020**		0.014		0.018*		0.020**		0.019*
		(0.327)		(0.094)		(0.134)		(0.298)		(0.029)		(0.135)		(0.071)		(0.029)		(0.063)
Cash		-0.006		-0.003		-0.003		-0.005		-0.004		-0.002		-0.002		-0.005		-0.002
		(0.169)		(0.370)		(0.403)		(0.223)		(0.278)		(0.494)		(0.611)		(0.227)		(0.609)
FR		-0.002		-0.003		-0.002		-0.002		-0.002		-0.002		-0.002		-0.001		-0.002
		(0.527)		(0.368)		(0.475)		(0.460)		(0.565)		(0.473)		(0.463)		(0.610)		(0.486)
Number of obs		1,171		1,162		1,130		1,224		1,299		1,179		1,201		1,240		1,137
Wald chi2		99.26		96.3		106.24		179.24		119.11		190.8		158.73		138.07		329.7
Prob > chi2		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000
Pseudo R2		0.1533		0.142		0.1613		0.1555		0.1417		0.1586		0.1577		0.1421		0.1574
Year effects		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes
Industry effects		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes

Table 5.7: Logit regressions of DRCs

This tables reports results from logit regressions on whether CEO DB pension are related to the dependent variable DRCs that equals to 1 if the company made DRCs and 0 otherwise. Models 1 to 3 include a dummy variable aboveCAP-member that equals to 1 if CEO or CFO is a member of DB pension schemes with the pension above the compensation threshold. Models 4 to 6 include Annual-pension and Models 7 to 9 include Total-pension. Regressions reported in this table control for Board-tenure. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Standard errors are clustered at the company-level.

Dependent variable: DRCs (dummy)	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
CEO-aboveCAP-member	2.485***				2.531***													
	(0.003)				(0.003)													
CEO-Annual-pension								0.023**				0.021**						
								(0.027)				(0.036)						
CEO-Total-pension														0.002***				0.002**
														(0.005)				(0.016)
ln (CEO-Board-tenure)		-0.079*				-0.066		-0.071*				-0.070*		-0.066*				-0.060
		(0.059)				(0.138)		(0.064)				(0.099)		(0.087)				(0.154)
Accounting-background	1.810*				1.871*		1.590				1.710*		2.055***				1.949**	
	(0.075)				(0.065)		(0.129)				(0.082)		(0.009)				(0.023)	
CFO-aboveCAP-member			1.411		1.151													
			(0.272)		(0.646)													
CFO-Annual-pension										0.006		0.000						
										0.000		(0.965)						
CFO-Total-pension																0.001		0.000
																(0.202)		(0.662)
ln (CFO-Board-tenure)				-0.041		-0.018				-0.015		0.022				-0.024		0.002
				(0.355)		(0.666)				0.000		(0.497)				(0.514)		(0.953)
Single-scheme	1.452		1.355		1.594		1.318		1.285		1.416		1.437		1.245		1.528	
	(0.292)		(0.395)		(0.173)		(0.390)		(0.447)		(0.267)		(0.268)		(0.513)		(0.184)	
%Equity		-0.004**		-0.004*		-0.004**		-0.004**		-0.003*		-0.004**		-0.004**		-0.003*		-0.004**
		(0.034)		(0.063)		(0.036)		(0.028)		(0.083)		(0.030)		(0.025)		(0.093)		(0.028)
Closure-to-FA		0.051**		0.044**		0.054***		0.040*		0.041**		0.040*		0.047**		0.046**		0.050**
		(0.014)		(0.031)		(0.009)		(0.058)		(0.047)		(0.055)		(0.022)		(0.026)		(0.015)
Maturity		0.013		0.014		0.015		0.014		0.014		0.017		0.008		0.011		0.011
		(0.566)		(0.555)		(0.510)		(0.472)		(0.520)		(0.397)		(0.698)		(0.620)		(0.609)
ln (Company-size)		-0.026		-0.02		-0.022		-0.037		-0.026		-0.035		-0.039		-0.03		-0.042
		(0.437)		(0.567)		(0.511)		(0.229)		(0.408)		(0.254)		(0.214)		(0.333)		(0.193)
Leverage		0.001		0.000		0.001		0.001		0.000		0.001		0.001		0.000		0.000
		(0.670)		(0.917)		(0.810)		(0.669)		(0.942)		(0.770)		(0.737)		(0.914)		(0.880)
ROA		0.006		0.005		0.005		0.007**		0.004		0.006*		0.007*		0.003		0.006
		(0.133)		(0.210)		(0.202)		(0.040)		(0.250)		(0.085)		(0.084)		(0.396)		(0.150)
Dividends		0.015		0.017*		0.015		0.014		0.020**		0.014		0.018*		0.021**		0.018*
		(0.136)		(0.086)		(0.145)		(0.143)		(0.027)		(0.152)		(0.074)		(0.026)		(0.064)
Cash		-0.004		-0.004		-0.004		-0.003		-0.004		-0.003		-0.002		-0.005		-0.002
		(0.300)		(0.320)		(0.304)		(0.355)		(0.265)		(0.467)		(0.526)		(0.204)		(0.546)
FR		-0.002		-0.003		-0.002		-0.002		-0.002		-0.002		-0.002		-0.001		-0.002
		(0.442)		(0.387)		(0.423)		(0.401)		(0.572)		(0.439)		(0.421)		(0.617)		(0.435)
Number of obs		1,165		1,162		1,130		1,219		1,299		1,179		1,201		1,240		1,137
Wald chi2		101.99		93.62		107.56		181.91		116.61		225.27		169.22		137.19		388.61
Prob > chi2		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000
Pseudo R2		0.1631		0.1414		0.1682		0.1621		0.1415		0.1637		0.1632		0.1418		0.1636
Year effects		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes
Industry effects		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes

Table 5.8: Logit regressions of DRCs

This tables reports results from logit regressions on whether CEO DB pension are related to the dependent variable DRCs that equals to 1 if the company made DRCs and 0 otherwise. Models 1 to 3 include a dummy variable aboveCAP-member that equals to 1 if CEO or CFO is a member of DB pension schemes with the pension above the compensation threshold. Models 4 to 6 include Annual-pension and Models 7 to 9 include Total-pension. Regressions reported in this table control for Age. All variables are defined in Table 4.1. P-values are reported in parentheses. ***, **, and * denote the significance of the estimated coefficients at 1%, 5%, and 10% levels. Standard errors are clustered at the company-level.

Dependent variable: DRCs (dummy)	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx	Odds	dy/dx
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
CEO-aboveCAP-member	2.138**				2.365***													
	(0.011)				(0.005)													
CEO-Annual-pension								0.021**				0.020**						
								(0.029)				(0.031)						
CEO-Total-pension														0.002***				0.001**
														(0.007)				(0.018)
ln (CEO-Age)		0.006				0.053		-0.053				-0.065		-0.173				-0.150
		(0.984)				(0.854)		(0.840)				(0.815)		(0.525)				(0.606)
Accounting-background	1.795*				1.946**		1.573				1.800*		1.997				1.976**	
	(0.077)				(0.046)		(0.139)				(0.056)		(0.013)				(0.021)	
CFO-aboveCAP-member			1.203		0.987													
			(0.531)		(0.966)													
CFO-Annual-pension										0.003		-0.002						
										(0.763)		(0.831)						
CFO-Total-pension																0.000		0.000
																(0.418)		(0.880)
ln (CFO-Age)				0.091		0.205				0.241		0.432				0.152		0.241
				(0.759)		(0.491)				(0.322)		(0.095)				(0.550)		(0.358)
Single-scheme	1.458		1.378		1.655		1.343		1.315		1.482		1.474		1.274		1.598	
	(0.296)		(0.368)		(0.145)		(0.363)		(0.413)		(0.220)		(0.241)		(0.473)		(0.149)	
%Equity		-0.004**		-0.004*		-0.004*		-0.004**		-0.003*		-0.004*		-0.004**		-0.003*		-0.004**
		(0.050)		(0.066)		(0.055)		(0.034)		(0.090)		(0.056)		(0.032)		(0.089)		(0.043)
Closure-to-FA		0.049**		0.041**		0.050**		0.040*		0.039*		0.037*		0.046**		0.044**		0.047**
		(0.020)		(0.044)		(0.018)		(0.063)		(0.055)		(0.076)		(0.029)		(0.035)		(0.025)
Maturity		0.020		0.013		0.015		0.021		0.012		0.016		0.011		0.010		0.011
		(0.366)		(0.589)		(0.530)		(0.295)		(0.605)		(0.454)		(0.592)		(0.663)		(0.597)
ln (Company-size)		-0.022		-0.022		-0.021		-0.032		-0.03		-0.035		-0.033		-0.034		-0.04
		(0.533)		(0.527)		(0.540)		(0.323)		(0.319)		(0.263)		(0.304)		(0.268)		(0.219)
Leverage		0.000		0.000		0.001		0.000		0.000		0.000		0.001		0.000		0.000
		(0.859)		(0.861)		(0.809)		(0.844)		(0.950)		(0.869)		(0.773)		(0.935)		(0.958)
ROA		0.005		0.004		0.004		0.007*		0.004		0.005		0.006		0.003		0.005
		(0.226)		(0.256)		(0.305)		(0.074)		(0.331)		(0.179)		(0.132)		(0.460)		(0.244)
Dividends		0.011		0.017*		0.017		0.011		0.021**		0.016*		0.019*		0.021**		0.020**
		(0.305)		(0.078)		(0.103)		(0.265)		(0.022)		(0.096)		(0.060)		(0.022)		(0.044)
Cash		-0.006		-0.003		-0.003		-0.005		-0.004		-0.002		-0.002		-0.004		-0.002
		(0.174)		(0.387)		(0.457)		(0.214)		(0.311)		(0.593)		(0.607)		(0.255)		(0.684)
FR		-0.002		-0.002		-0.002		-0.002		-0.001		-0.002		-0.002		-0.001		-0.002
		(0.533)		(0.445)		(0.537)		(0.475)		(0.645)		(0.555)		(0.452)		(0.662)		(0.520)
Number of obs		1,165		1,161		1,123		1,218		1,298		1,172		1,195		1,239		1,130
Wald chi2		91.93		94.7		109.77		170.06		124.48		218.92		167.62		143.13		367.66
Prob > chi2		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000
Pseudo R2		0.1524		0.1402		0.1637		0.1535		0.143		0.1631		0.1583		0.1421		0.1603
Year effects		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes
Industry effects		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes

REFERENCES

Aaronson, S. R., and J. L. Coronado, (2005). "Are Firms or Workers Behind the Shift Away from DB Pension Plan?". Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary, Affairs Federal Reserve Board, Washington, D.C.

Acharya, V. V., Almeida, H., and Campello, M., (2007). “Is cash negative debt? A hedging perspective on corporate financial policies”. Journal of Financial Intermediation, Vol. 16, No. 4, Pages 515-554.

Adams, R.B., Almeida, H., and Ferreira, D., (2005). “Powerful CEOs and their impact on corporate performance”. Review of Financial Studies, Vol. 18, no. 4, Pages 1403-1432

Addoum, J. M., van Binsbergen, J. H., and Brandt, M. W., (2010). “Asset Allocation and Managerial Assumptions in Corporate Pension Plans”.

Aggarwal, R. K., and Samwick, A. A., (2003). “Why do managers diversify their firms?”, Journal of Finance, Vol. 58, no. 1 (February), Pages 71-118.

Aggarwal, R., and Samwick, A. A., (2002). “The other side of the trade-off: the impact of risk on executive compensation – a reply”. Dartmouth College Working Paper No. 02-19.

Alderson, Michael J. and K.C. Chen, “Excess Asset Reversions and Shareholder Wealth,” Journal of Finance, 1986, Pages 87-97.

Ali, A., & Zhang, W. (2015). CEO tenure and earnings management. Journal of Accounting and Economics, Vol. 59, No. 1, Pages 60-79.

Almeida, H., Campello, M., and Weisbach, M. S., (2011). “Corporate financial and investment policies when future financing is not frictionless” Journal of Corporate Finance, Vol. 17, Pages 675- 693.

Anantharaman, D., and Lee, Y. G., (2014). “Managerial risk-taking incentives and corporate pension policy”. Journal of Financial Economics, Vol. 111, No. 2, Pages 328- 351.

Antia, M., Pantzalis C., and Park J. C., (2010). “CEO decision horizon and firm performance: An empirical investigation,” Journal of Corporate Finance, Vol. 16, No. 3, Pages 288– 301.

Antolin, P., (2008). "Pension Fund Performance." OECD Working Papers on Insurance and Private Pensions.

ASB, 2007. Reporting statement: retirement benefits – disclosures. London: Accounting Standards Board.

Asthana, S., (1999). “Determinants of funding strategies and actuarial choices for defined-benefit pension plans”. Contemporary Accounting Research, Vol. 16, No. 1, Pages 39- 74.

Asthana, S., (2008). “Earnings management expected returns on pension assets, and resource allocation decisions”. Journal of Pension Economics and Finance, Vol. 7, No. 2, Pages 199–220.

Banks, J., Blundell, R., and Emmerson, C., (2005). “The balance between defined benefit, defined contribution and state provision”. Journal of the European Economic Association, Vol. 3, No. 2–3, Pages 466–476.

Barker, V. L., and Mueller, G. C., (2002). “CEO characteristic and firm R&D spending”. Management Science, Vol. 48, No. 1, Pages 782-801.

Barth, M., Beaver W., and Landsman W., (1992). “The market valuation implications of net periodic pension cost components”. Journal of Accounting and Economic,s Vol. 15, Pages 27-62.

Bartram, S. M., (2018). “In good times and in bad: Defined-benefit pensions and corporate financial policy”. Journal of Corporate Finance, Vol. 48, Pages 331-351.

Bates, Thomas W., Kahle, Kathleen M., and Stulz, René M., (2009). “Why do US firms hold so much more cash than they used to?”. Journal of Finance, Vol. 64, No. 5, Pages 1985–2021.

Begley, J., Chamberlain, S., Yang, S., and Zhang, J. L., (2015). “CEO incentives and the health of defined benefit pension plans”. Review of Accounting Studies, Vol. 20, No. 3, Pages 1013-1058.

Belsley, D. A., Kuh, E., and Welsh, R. E., (1980). "Regression Diagnostics: Identifying Influential Data and Sources of Collinearity". New York, NY: John Wiley and Sons.

Bennett, R., Guntay, L., and Unal, H., (2015). "Inside Debt, bank default risk and performance during the crisis". Journal of Financial Intermediation, Vol. 24, No. 4, Pages 487-513

Bereskin, F., (2009). "Determinants of defined benefit plan policies". Working paper. University of Rochester.

Bergstresser, D., Desai, M., and Rauh, J., (2006). "Earnings manipulation, pension assumptions, and managerial investment decisions". Quarterly Journal of Economics, Vol. 121, No. 1, Pages 157-195.

Bikker, J.A., and De Drew, J., (2007). "Operating Costs of Pension Funds: the impact of scale, governance and plan design". Journal of Pension Economics and Finance, Vol. 8, Pages 63-89.

Billings M., O Brien C., Woods M., Vencappa D., (2017). "Discretion in accounting for pensions under IAS 19: using the 'magic telescope?". Accounting and Business Research, Vol 47, No. 2, Pages 123-143.

Black F., (1980). "The Tax Consequences of Long-run Pension Policy". Financial Analysts Journal, Vol. 36, Pages 21-28.

Bodie, Z., and Shoven, J., (1983). "Financial Aspects of the United States Pension System. University of Chicago Press.

Bodie, Z., Light, O.J., Mørck, R., and Taggart, R.A., (1987). "Funding and asset allocation in corporate pension plans: an empirical investigation". Issues in pension economics. Chicago: University of Chicago Press, Pages 15–48.

Bozewicz, J., (2004). "Changes Ahead: Pension Liabilities and New Discount Rate Assumptions". AFP Exchange, Vol. 24, No. 2, Pages 36-48.

Broadbent J., Palumbo M., and Woodman E., (2006). “The Shift from Defined Benefit to Defined Contribution Pension Plans – Implications for Asset Allocation and Risk Management”. BIS Working Paper.

Bunn, P., Mizen, P., and Smietanka, P., (2018). “Growing pension deficits and the expenditure decisions of UK companies”, Bank of England Working Paper No. 714.

Byrne, A., Clacher, I., Hillier, D., and Hodgson, A., (2007). “Fair value accounting and managerial discretion”. Working Paper No. 2, Leeds University Business School, UK.

Carroll, T.J., and Niehaus, G., (1998). “Pension plan funding and corporate debt”. Journal of Risk and Insurance, Vol. 65, No. 3, Pages 427–441.

Campbell, J. L., Dhaliwal, D. S., and Schwartz, W. C., (2012). “Financing constraints and the cost of capital: Evidence from the funding of corporate pension plans”. Review of Financial Studies, Vol. 25, No. 3, Pages 868–912

Cassell, C. A., Huang, S. X., Sanchez, J. M., and Stuart, M. D., (2011). “Seeking Safety: The Relation between CEO Inside Debt Holdings and the Riskiness of Firm Investment and Financial Policies”. Journal of Financial Economics, Vol. 103, No. 3, Pages 588-610.

Chava, S., and Amiyatosh P., (2010). “CEOs versus CFOs: Incentives and Corporate Policies” Journal of Financial Economics, Vol. 97, Pages 263-278.

Cheng, Q., and Swenson, L., (2018). “Executive Compensation and Cash Contributions to Defined Benefit Pension Plans”. Journal of Business Finance & Accounting, Vol. 45, No. 9-10, Pages 1224-1259

Cheng, Q. and Michalski, L., (2010). “Contributions to Defined Benefit Pension Plans: Economic and Accounting Determinants”. Research Collection School of Accountancy.

Cheng, S., (2004). “R&D Expenditures and CEO Compensation”. Accounting Review, Vol. 79, No. 2, Pages 305–328.

Cocco, J.F., and Volpin P., (2007). “The corporate governance of defined benefit pension plans: evidence from the United Kingdom”. Financial Analysts Journal, Vol. 63, No. 1, Pages 70-83.

Cohen, R. B., Hall, B. J., and Viceira, L. M., (2000). “Do executive stock options encourage risk-taking?”. Unpublished Manuscript, Harvard University.

Comprix, J., and Muller III, K.A., (2006). “Asymmetric Treatment of Reported Pension Expense and Income Amounts in CEO Cash Compensation Calculations”. Journal of Accounting and Economics, Vol. 42, No. 3, Pages 385-416.

Comprix, J., and Muller III, K. A., (2011). “Pension plan accounting estimates and the freezing of defined benefit pension plans”. Journal of Accounting and Economics, Vol. 51, No. 1-2, Pages 115-133.

Conyon, M., (2006). “Executive Compensation and Incentives”. Academy of Management Perspectives, Vol. 20, No. 1, Pages 25-44.

Cooper, Russell W., and Ross, Thomas W., (2002). “Pensions, Theories of Underfunding”. Labour Economics, Vol. 8, No. 6, Pages 667-689.

Core, J. E., Guay, W. R., and Larcker, D. F., (2003). “Executive Equity Compensation and Incentives: A Survey”. Economic Policy Review, Vol. 9, No. 1, Pages 27-50.

Core, J., and Guay, W., (1999). “The use of equity grants to manage optimal equity incentive levels”. Journal of Accounting and Economics, Vol. 28, Pages 151-184.

Bergstresser, D., Desai, M., and Rauh, J., (2006). “Earnings Manipulation, Pension Assumptions, and Managerial Investment Decisions”. The Quarterly Journal of Economics, Vol. 121, No. 1, Pages 157–195

Davidson III, W. N., Xie, B., Xu, W., and Ning, Y., (2007). “The influence of executive age, career horizon and incentives on pre-turnover earnings management”. Journal of Management and Governance, Vol. 11, No. 1, Pages 45-60.

Davila, A., and Peñalva, F., (2006). "Governance structure and the weighting of performance measures in CEO compensation". Review of Accounting Studies, Vol. 11, Pages 463-493.

Davis, E. P., and de Haan L., (2012). "Pension fund finance and sponsoring companies". Journal of Pension Economics and Finance, Vol. 11, No. 3, Pages 439-463

Dechow, P. M., and Sloan, R. G., (1991). "Executive incentives and the horizon problem: An empirical investigation". Journal of Accounting and Economics, Vol. 14, No. 1, Pages 51-89.

Deng, K., He, J., King, D., and Zhang, J., (2019). "Does inside debt alleviate banks' risk taking? Evidence from a quasi-natural experiment in the Chinese banking industry". Emerging Markets Review, Vol. 40, 100622

Denis, D. J., and Mckeon, S. B., (2012). "Debt Financing and Financial Flexibility Evidence from Proactive Leverage Increases". The Review of Financial Studies, Vol. 25, No. 6, Pages 1897-1929.

Denis DJ., and Sibilkov V., (2010) Financial constraints, investment, and the value of cash holdings. Rev Financ Stud 23:247-269

Dhaliwal, D., Li, O.Z., Tsang, A.H., and Yang, Y.G., (2011). "Voluntary non-financial disclosure and the cost of equity capital: The case of corporate social responsibility reporting". The Accounting Review, Vol. 86, No. 1, Pages 59-100.

"DWP White Paper - protecting Defined Benefit pension schemes", (2018).

Dyck, A., and Pomorski L., (2011). "Is Bigger Better? Size and Performance in Pension Plan Management".

Edmans, A. and Liu, Q., (2011). "Inside debt". Review of Finance, Vol. 15, No. 1, Pages 75-102

Fama, E. and Jensen, M., (1983). "Separation of ownership and control", Journal of Law and Economics, Vol. 26, No. 2, Pages 301–25.

Fama, E.F., and French, K.R., (1992). “The cross-section of expected stock returns”. Journal of Finance, Vol XLVII, No. 2, Pages 427– 465.

Fee, C. E. & Hadlock, C. J., (2004). “Management Turnover across the Corporate Hierarchy”. Journal of Accounting and Economics, Vol. 37, No. 1, Pages 3-38.

Feldstein, M., and Seligman, S., (1981). “Pension funding share prices and national savings”. Journal of Finance, Vol. 36, No. 4, Pages 801-824.

Feng, M., W. Ge, S. Luo, and T. Shevlin., (2011). “Why do CFOs become involved in material accounting manipulations?”. Journal of Accounting and Economics, Vol. 51, No. 1-2, Pages 21–36.

Finkelstein, S., and Hambrick, D. C., (1989). “Chief Executive Compensation: A Study of the Intersection of Markets and Political Processes”. Strategic Management Journal, Vol. 10, No. 1, Pages 121-134.

Florackis, Chris and Sainani, Sushil, How Do Chief Financial Officers Influence Corporate Cash Policies? (August 29, 2018). Journal of Corporate Finance, Forthcoming. Available at SSRN: https://ssrn.com/abstract=2932832 or http://dx.doi.org/10.2139/ssrn.2932832

Franzoni, F., and Martin J. M., (2006). “Pension plan funding and stock market efficiency”. Journal of Finance, Vol. 61, No. 2, Pages 921–956.

Freund S., Latif S. and Phan H.V., (2018). “Executive compensation and corporate financing policies: evidence from CEO inside debt”. Journal of Corporate Finance, Vol 50, Pages 484–504.

Gallagher, R., McKillop, D. G., and Pogue, M., (2011). “The Influence of Pension Plan Risk on Equity Risk: A Study of FTSE100 Companies – 2002 to 2008”. Review of the Regulatory Allowed Rate of Return of BT plc

“Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations— Background Paper”. Report to the G-20 Finance Ministers and Central Bank Governors. IMF, October 2009.

Cohen G., and Yagil J., (2009). "Why do financially distressed firms pay dividends?”. Applied Economics Letters, Taylor & Francis Journals, Vol. 16, No. 12, Pages 1201-1204.

Ginglinger, E., and Saddour, K., (2012). “Cash holdings, corporate governance and financial constraints”. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2154575

Godwin, J.H., Goldberg, S.P., and Duchac, J.E., (1996). “An Empirical Analysis of Factors Associated with Changes in Pension-Plan Interest-Rate Assumptions”. Journal of Accounting, Auditing, and Finance, Vol. 11, No. 2, Pages 305–323.

Godwin, N.H., (1999). “An examination of pension actuarial assumptions over the decade following the issuance of FAS 87”. Journal of Pension Planning and Compliance, Vol. 25, No. 1, Pages 62–75.

Gold, J., (2005). “Accounting/Actuarial Biases Enable Equity Investment by Defined Benefit Pension Plans”. North American Actuarial Journal, Vol. 9, No. 3, Pages 1-21

Gopalakrishnan, V. and Sugrue, T. F., (1995). “The Determination of Actuarial Assumptions under Pension Accounting Disclosures,” Journal of Financial and Strategic Decisions, Vol.8, No.1, Pages 35-41.

Hambrick, D., and Mason, P., (1984). “Upper echelons: the organization as a reflection of its top managers”. Academy of Management Review, Vol. 9, No. 2, Pages 193-206.

Harris, C., and Roark, S., (2019). “Cash flow risk and capital structure decisions”. Finance Research Letters Vol. 29, Pages 393-397.

Harris, D., and Helfat, C., (1997). “Specificity of CEO human capital and compensation”. Strategic Management Journal, Vol. 18, No. 11, Pages, 895–920.

Herzenberg, S., and Sarabeth, S., (2013). A (Misguided) “Solution” to a Nonexistent Problem. Harrisburg: Keystone Research Centre.

Hoechle, D., (2007). "Robust standard errors for panel regressions with cross-sectional dependence". Stata Journal, Vol. 7, No. 3, Pages 281-312.

House of Commons report from 2013: Royal Mail Pension Plan. Available at: https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN04940#fullreport

Hsieh, T.S., Wang, Z., Demirkan, S., (2018). "Overconfidence and Tax Avoidance: The Role of CEO and CFO Interaction". Journal of Accounting and Public Policy, Vol. 37, No. 3, Pages 241–253.

Hubbard, R. G., (1998). "Capital-Market Imperfections and Investment". Journal of Economic Literature, Vol. 36, No.1, Pages193-225.

Impavido, G., and I. Tower., (2009). "How the financial crisis affects pensions and insurance and why the impacts matter". IMF Working Paper WP/09/151, Washington D.C.

Ippolito, R. A., (1986). "Pensions". Economics and Public Policy. Dow Jones-Irwin, Homewood, II.

Jensen, M., and Meckling, W., (1976): "Theory of the firm: managerial behavior, agency costs and ownership structure", Journal of Financial Economics, Vol. 3, Pages 305–360.

Jiang, F. & Zhu, Bing & Huang, Jicheng, (2013). "CEO's financial experience and earnings management. Journal of Multinational Financial Management, Vol. 23. No. 3, Pages 134-145.

Jiang, J., Petroni, K., Wang, We., (2010). "CFOs and CEOs: who have the most influence on earnings management?" Journal of Financial Economics, Vol. 96, Pages 513–526.

Jin, Li & Merton, Robert C. & Bodie, Zvi (2006). "Do a firm's equity returns reflect the risk of its pension plan?". Journal of Financial Economics, Vol. 81, No. 1, Pages 1-26.

Kabir, R., Li, H., and Veld-Merkoulova, Y., (2018). "Do managers act opportunistically towards the end of their career?" Journal of International Financial Markets, Institutions and Money, Vol. 56, Pages 218-232

Kabir, Rezaul and Li, Hao and Veld-Merkoulova, Yulia V. (2013). "Executive Compensation and the Cost of Debt" (August 1, 2013). Journal of Banking and Finance, Vol. 37, No. 8.

Kalyta, P., (2009). “Accounting discretion, horizon problem, and CEO retirement benefits”. The Accounting Review, Vol. 84, No. 5, Pages 1553-1573.

Kisser, M., Kiff, J., and Soto, M., (2017). “Do managers of US defined benefit pension plan sponsors use regulatory freedom strategically?”. Journal of Accounting Research, Vol. 55, No. 5, 1213-1255.

Hoyos, R. E. and V. Sarafidis (2006). "Testing for cross-sectional dependence in panel-data models." Stata Journal 6(4): 482.

Pesaran, M. H., A. Ullah, and T. Yamagata. 2006. A bias-adjusted test of error cross section dependence. Available at http://www.econ.cam.ac.uk/faculty/pesaran/PUY10May06.pdf.

Cassell, C., Huang, S., Sanchez, J. (2013). Forecasting without consequences? Evidence on the properties of retiring CEOs’ forecasts of future earnings. The Accounting Review, 88, 1909–1937.

Conyon, M., Florou, A. (2006). The pattern of investment surrounding CEO retirements: UK evidence. The British Accounting Review, 38, 299–319.

Finkelstein, S., 1992. Power in top management teams: Dimensions, measurement, and validation. Academy of Management Journal 35 (3), 505–538.

Florackis, Chris and Sainani, Sushil, How Do Chief Financial Officers Influence Corporate Cash Policies? (2018). Journal of Corporate Finance, Vol. 52, October 2018, Pages 168-191.

Graham, J. R., Harvey, C. R., Puri, M., 2015. Capital allocation and delegation of decision-making authority within firms. Journal of Financial Economics 115 (3), 449–470.

Inman, P. 2015. Quantitative easing: seven years of unconventional monetary policy. The Guardian, 20 January. Available at: http://www.theguardian.com/business/2015/jan/20/quantitative-easingunconventional-monetary-policy

Johnson, S. (2014). “London pension body sells entire stock of UK gilts”. *The Financial Times*.

Joyce, M, and Tong, M (2012), ‘QE and the gilt market: a disaggregated analysis’, Economic Journal, vol. 122, pp. 348–84

Joyce, M, Lasaosa, A, Stevens, I and Tong, M (2011), ‘The financial market impact of quantitative easing in the United Kingdom’, International Journal of Central Banking, vol. 7(3), pp. 113–61.

Joyce, M, McLaren, N, and Young, C. (2012), ‘Quantitative easing in the United Kingdom: evidence from financial markets about QE1 and QE2’, Oxford Review of Economic Policy, vol. 28(4), pp. 671–701.

Reuters (2018). “Factbox-What will happen to Carillion’s pensions?” Available at: https://uk.reuters.com/article/uk-carillion-restructuring-pensions-fact/factbox-what-will-happen-to-carillions-pensions-idUKKBN1F51WZ

The Economist (2012). “How real rates hurt pension funding”. Available at: https://www.economist.com/finance-and-economics/2012/05/05/stuck-in-the-middle

Thurley, D. (2018). “Carillion Pension Schemes”. Briefing paper, Number CBP-8316, 5 July 2018, House of Commons.

United Nations (2017) World Population Prospects: 2017 Revision, Department of Economic and Social Affairs, New York.

Zalewska, A. (2018). “Huge pension fund deficits are a global crisis in waiting”. *The Conversation*.